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HYPOTHYROIDISM*

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It would be impossible for one to attempt in the limits of a short address to cover the subject of hypothyroidism. I have, in the lantern slides I present today, a fairly comprehensive outline of this disorder. Whiie I talk to you upon a few points, you can read the balance of the slide and thus more fully orient yourselves with the subject.

Hypothyroidism in its severe manifestations is easily recognized. My experience would justify the statement that few are on the lookout for the minor manifestations of the disorder so that it is hypothy. I am going to present to you today, something that is very little known, apparently, that is very rarely or comparatively rarely diagnosed, although it is quite frequently present and for that reason should be recognized. As it is easily amenable both to medical and physical treatment, this failure may mean the difference between success and failure in a given case. The thyroid gland is the activator of the human body. It activates other secretions and other tissues, it is a great catalyzer, in that it splits proteins into amino acids, an extremely important function in the body. It is an increaser of oxidation at all times. We might put it this way: In its oxidative activity it removes from the body the human clinkers; that is to say it resolves the clinkers into excretible products that pass out through the emunctories.

I shall never forget the interest with which I read the first report on thyroid disfunction. This was, as you will see, described many years ago and was confirmed by McKenzie and Fox and Howitz of Copenhagen, showing that the administration of thyroid converted the thyrostruma in dogs, and particularly that it had its potent effect in the human as well, whether it were given orally or whether it were given by injection into the body.

If we take up the types of hypothyroidism, we will find that they are divided into those of the pre-adolescent period and those of the post-adolescent period. Here in the pre-adolescent period we find the children who are suffering from the delayed developmental characteristics and who are often times sent to the so-called mental clinics in order that they may have a mentality test. A number of children have been pronounced mentally retarded when that was

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not the case, but they were really nothing more nor less than hypothyroid individuals and yet not cretins.

I call your attention to the atypical types of hypothyroidism. These are the "quite" of the French; the mild myxedemas, the borderliners, as I am pleased to call them, the betwixt and between, the atypical types that are so rarely recognized and that show only a few of the subjective and sometimes a few of the objective symptoms that enable us to make a rational diagnosis. Diagnosis is often times very materially helped by the fact that we are on the lookout for things.

The reason I think cancer is today much more frequently diagnosed is due to the fact that the medical profession is looking for it and in that way fewer cases are missed.

In my hospital and clinic, it is part of the regular examination to test the basal metabolism of each case. This may give us the ciue, or settle a doubtful diagnois. An interesting form of the hypothyroid state is the senescent type, the type that gives the appearance of premature senility, the old-looking boy or girl who give you the impression at once that you are dealing with either a sick person or a person who is affected with some severe internal medical condition.

When we come to study the effect of the thyroid gland upon the individual and its absence, we will start with the higher or mental phase of the condition. This is a very important one. Often times we find, as I said, that these children are irritable, cry easily, have a disinclination to work or play, who are more or less the "enfant terrible" to the teacher, and whom the teacher finally decides that they need "a mental test." Their mentality may be so lowered as to almost make them appear mental defectives.

The adult individual will come into your office complaining of physical and mental tire; lack of ability to carry on work, have a dull, tired, forgetful manner and if you test the case out it will be shown that cerebral activity is undoubtedly lowered. If you are watchful, you will recognize the real underlying condition.

Hyperthyroid patients, as a rule, are good sleepers; in fact, they look sleepy all the time. They come complaining of the dull, heavy, tired headache that no amount of medication for their digestive disturbance or their constipation, no correction of glasses, nothing that you have done or others have done has helped at all. The patient will tell you that from the hour he gets up in the morning he is tired and is unable to do his work. Be on the lookout in that kind of a case for lowered activity due to the thyroid gland.

The important thing to remember about the physical activity of the individuals is that they are slow and usually dislike to move about. They lack activity, are lethargic, the exact opposite of the hyper-thyroid type, who are irritable, quick, active, restless, trembly individuals, whereas perhaps tall, slender, wiry, while here we have the short, heavy-set, sluggish, broadly built, thick, clumsyhanded individual.

In the eye we find that the palpebral fissure is apt to be narrowed, that the upper lid has a tendency to drop, giving the individual a rather slight but, nevertheless, perceptible Mongolian expression.

In the nose and throat we find in the children that there is a tendency to adenoids and to frequent tonsillitis. These patients frequently have tonsillitis because their resistive power, their power to overcome infection is lowered due to the inactivity of the thyroid glands. This, together with the tendency to thick lips, should again put us on to what the real condition is underlying the patient.

When we come to the skin we have a wide field for diagnosis. Thyroid individuals perspire lightly; they are more or less always cold; have cold hands and cold feet, even when they are not indulging in certain card games. They perspire with difficulty and are the kind of individuals who want to pull down or push up a window so that there will not be even a slight draft blowing upon them. This sensitiveness is one reason why they suffer frequently from coryzas and from bronchial disturbances. The hair is usually coarse and brittle, it breaks easily, cracks and crinkles. There may be premature baldness and greyness. The nails are brittle. They, like the hair, are apt to break and become ridged. It is an interesting thing that as the patient improves under treatment, we notice the gradual growth of a new nail.

There is a tendency to bronchial disturbances. In the caloric field, a subnormal temperature is usually present with sensitiveness to cold. These cases, the opposite of the hyperthyroid in that we have a slow heart, usually regular. It is not affected by emotional stress, because the hypothyroid individual lacks emotional activity, because of the absence of the thyroid secretion. These are the patients who will come in and tell you, "Doctor, I always feel better in summer. Winter is my bad time."

Another interesting observation that I made early in the study of these disorders was the fact that these patients require extremely careful training in the use of hydrotherapy and especially that form of hydrotherapy that we call tonic; that is to say the use of cold water in its various applications. It has to be used with discrimination and care.

In small children we have frequent disturbances of the teeth. It is not an uncommon thing for the child to present the typical "pot-bellied" appearance. I have known quite a number of hypothyroid individuals, males principally, who actually craved sweets nearly as much as an alcoholic craves alcohol. It is astonishing sometimes the number, the frequency and the amount of sweet things that these patients will eat. This is explained, I believe, by the low metabolism; they do not assimilate the sweets as they should and, consequently, do not obtain the normal energy from their digestive tracts that they would otherwise secure.

As the thyroid activates other secretions, we may expect failure of the juices of the digestive tube. As I have shown, we may have disturbance from the salivary secretion all the way through to the colon. I do not know of any more severe obstipation than is present in cases of hypothyroidism. Patients who are victims of not the laxative, but the *purgative* habit, should be at once suspected of having disturbed thyroid glands. We have a lack of the stimulation to the nervous mechanism of the abdomen; that in its turn lessens the tonus of the whole tract, tends to produce stasis, and an inability to handle the material in this tract.

Not only do we find young people looking old, of which I spoke, but we often times find *elderly* people looking *very aged,* far more so than their years or their life would reasonably make us expect. This, together with the dry, crinkly skin, the brittle hair and nails, the sluggish mentality, leads us again to the suspicion that we have to deal with a condition involving the thyroid gland. More than that, we find that they are extremely the subject of so-called autotoxemia, or what might be more correctly called the putrefactive toxemias, that come from the inactivity of the entire digestive tract. These people are slowed down, their energy is lessened and the other glandular systems, notably the adrenals and the gonads, which in their turn are activited by the thyroid, add to the already existing trouble in these senescent people.

Permit me to call your attention to the presence of the so-called "growing pains" in children. We are, of course, generally inclined to

look for infections, and that is a wise thing to look further and see if we have not to deal with inactivity of the thyroid gland. The fat boy, Joe, of Dickens, while he was probably pituitary, was also possibly hypothyroid. We often have a combination of the two, with tendency toward obesity. The metabolites accumulate and are eliminated; the metabolism is slowed to the point where the waste material of the body is not oxidized and carried off. Therefore, it accumulates, obstructing all the various organs and tissues of the body, and in its turn reducing the consumption of oxygen so that this one bad link in the chain adds to another link until the individual has been slowed down to a comparatively low plane.

How are we to diagnose this condition? I think, as I have said, one of the best diagnostic measures, of course, is a full knowledge of the conditions and symptoms that are produced.

The basal metabolic rate is something that should be performed many more times than it is. I for one do not believe that the present idea of allowing a margin of ten above and ten below is the very best idea, because it tends to divert the mind and the attention from other diagnostic points. If I have a person with a dry skin and other clinical symptoms that would point towards hypothyroidism, then a minus ten or fifteen would in my mind be a very strong corroborative point. Do not depend too much on the laboratory, but use it as a means of confirmation. Close study of one's cases will often enable us to make the diagnosis.

Easy fatigability may be due to the adrenals. Adrenal asthenia is overworked. Even if we have a very small or comparatively small metabolic change, we may have fatigability without organic disease. If we have lymphocytosis, dry skin and chilliness, a little slowing of the mental faculties, we must be alertly on the lookout for hypothyroid states.

What changes shall we bring about by therapy? Increase the draft in the furnace; burn up waste material; and at the same time re-activate the gland to take over the work. In the first place, we should administer thyroid gland and it should be administered in very small doses at the start and gradually worked up to larger doses. Physicians as a rule give too much thyroid extract. If a *small dose* does not prove effective, try a little activation from *iodin*. If you have to deal with a child, there is nothing better than giving the old-fashioned syrup of iodid of iron to bring that about.

I think one of the reasons why so many of the pot-bellied colored children that I used to see in my clinic before the days when I recognized, or any of us recognized hypothyroid states, improved under the use of what was then the accepted treatment of the case by syrup of the iodid of iron was not only because of the iron, but because of the iodin activating the thyroid gland.

Hydrotherapy is probably one of the most valuable agents that we have in the treatment of hypothyroid states, especially where it is preceded by a heating measure. You may choose for that superheated dry hot air, hot air, steam, incandescent electric light bath, the high wattage lamp, anything that will cause perspiration. These cases are not to be permitted to perspire freely. We do not want the fatigued cases that are characterized by hypothyroidism to have extreme perspiration; we want simply to open the glandular and vascular systems of the skin and collect there a large quantity of blood with the view that the patient will then be able to better react to the cold water that will be the terminal method of the administration. A good procedure in these cases is to give an electric light bath until the patient just commences to perspire, to follow that by the various sprays and douches of hot water at 104, 105, 106° F. even, and then by a very brief stimulating cold application 65-60° F., using the same spray.

This method increases the oxidative processes, and if at the same time that we apply the douche to the nape of the neck, we will stimulate reflexly the thyroid gland itself.

For the same reasons almost, and yet in a different way, we use mechanical massage. I don't mean using a vibrator. I mean the large machines that really work, not vibrators. I do not consider a vibrator of value in these cases. A machine that will give deep kneading, real mechanical exercise, will bring about a similar result in the hypothyroid individual as that brought about by hydrotherapy, but in less degree. The mechanically performed exercise has been substituted for the fatiguing actual exercise necessary to be performed by the patient. The individual is not putting out energy, but is attaining the same result without calling upon his own energy.

Autocondensation is useful given in the usual way, with the couch or chair. I prefer using the couch, as one side of the condenser and a large plate upon the abdomen as the other.

I consider the sinusoidal has little value, save in assisting in toning the abdomen and overcoming constipation. The static wave current either to the epigastric or to the lower abdomnial wall or per rectum with heavy condensers will bring about a condition of oxidation that is valuable. Those of you who have never used the static wave current hardly realize that we get here thermic, mechanical and chemical effects every time the current is broken. I prefer a short, powerful, sharp, concussive spark. It increases activity of the entire body, inside and out.

(Slides were then shown of minor and marked cases of hypothyroidism, cretinism, etc.)

DIATHERMY AND INTERNAL SECRETIONS*

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If we look at the different physiological actions which can be produced by the different methods of applying high frequency currents, we may consider these effects not only from the point of view of a pure organ-effect. The correlations between the different organs and their connection to the whole body are very complicated and the changement of the function of one organ can be the stimulus of an uncontrollable course of different alterations taking place in other organs far away from the site of the primary act. We know that besides the nervous control executed by the cerebral spinal nerve-system under the control of conscience and will, there is another nervous system, the so-called vegetative nervous system, which without the control of our knowledge or will is in connection with all organs, even with every cell. This system is worked and balanced by a wonderful mechanism and governs the total function of all organs containing smooth muscle cells and secreting gland cells. Especially the internal secretions are under this control and influence not only the functions of growth, digestion, metabolism, sexual life, but even all the combined functions which for a long time in life are characteristic for a whole personality and which we call the constitution of the individual.

This whole vegetative nervous system which is generally divided into two parts, from which

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one is regarded as antagonist of the other, which is not true for all circumstances, is on the other side influenced and directed by the internal secretions. This mutual balance is still more complicated by the fact that some of the internal secretions have the tendency to influence one side of the vegetative nervous system the sympatheticus, while some others influence the para-sympathicus system and are vagotrop. Besides there has been proven an inhibitory or stimulating action of some internal secretions to others, and all this together offers a picture of such great complication that it is not to be wondered that our knowledge in this territory is still rather confused. The experimental investigation advances very slowly, because the experimental extirpation of an inner-secretory gland does not only show the deficit of its secretion, but on account of the correlation of the whole endocrinal system a complementary increase of an opposite secretion. In some cases there may occur besides a complementary increase of a similarly acting secretion. So we are obliged to resign from the very start of overlooking in special cases all these features and we have to rely on very marked symptoms for the diagnosis of a special organ disease and our therapeutical results are often quite satisfactory, but if we are looking at many of our cases from the endrocrinological point of view, we understand very different inner connections. If we consider patients, who are easily irritable, who are sweating strongly suffering of constant constipation, of cold hands and feet, and complain of disagreeable sensations to the heart, so we have here a case of doubtless trouble of the vegetative nervous system which can be the primary trouble. but which just as well can be the consequence of endrocrinal trouble. I shall not enter here into the discussion of the technic to examine the state of the function of the sympathetic or para-sympathetic nervous system, nor on the methods we dispose of to test the secretion of the endrocrinal glands, for instance, the adrenalin-level of the blood. But I want to state that by our methods of physical treatment, we are enabled to stimulate or to reduce the function of any of these glands and to act upon the vegetative nervous system, too. For these purposes radium, x rays, diathermy, light, infra reds, water, mechanical applications and many other physical means are available and of variable effects. Today we shall only take in consideration the effect of diathermy.

If we take in hand two metal electrodes and apply for a few minutes the diathermy current of about 400 milliamperes, we shall notice that the palms of the hands are wet with sweat. The immediate effect of diathermy is a local action on a gland-secretion and it is not proven if this action is a real local one or a reflex. If we take a metal point and apply by means of a high frequency machine delivering a very high tension and very low milliamperage one or a few sparks to any place on the skin (these sparks are not sensitive nor do they burn like the sparks of a diathermy machine would do), we observe that after about 20 seconds a local area of goose flesh appears where the sparks fell on with anemia of the skin of oval shape, which after about one minute disappears and makes place for hyperemia. Here we have another effect, of vasomotor character and of smooth muscle cells, without sweat production.

These examples show you that by different applications of high frequency currents we can produce glandular and vasomotor effects just as well as effects on smooth muscle cells. That means that to a certain degree we are able to influence the internal secretion, to irritate the sympathetic and the para-sympathetic nervous system and the possibility to apply our high frequency currents to any deep situated organs, to any part of the skin, or, to the whole body. Herewith opens a very big field of experimental and therapeutical possibilities to which I wish to attract your attention for a few minutes.

Let us begin by thyroid glands. If the examination of the basal metabolism shows a reduction and other symptoms of hypo-thyroidism are present, for instance obesity, mental dullness, sleepiness, chronic constipation, edematous appearance of the skin, loss of hair, especially of the eyebrows, diathermic treatment of the thyroid gland is of greatest efficiency. Treatment has to be given carefully, especially if the gland is present in fairly good size. In such a case an intense diathermic treatment could throw such a great amount of thyroid secretion into the blood, that marked thyreo-toxic symptoms may occur the next day. Of course this treatment can only be active in cases of myxedema, if some amount of gland substance is still present. I make use of this treatment as auxiliary treatment in obesity, some cases of constipation, alopecia and others. This treatment is too available in cases of hyper-function of the ovaries. It stimulates the thyroid gland and acts against preponderating action of ovarian hormon.

In the same way we may stimulate the pancreas and the liver and influence herewith the blood sugar level and the whole metabolism of carbohydrates, fat and albumin. We cannot avoid, during this application to give some diathermical effect to the whole splanchnical system and to the big vegetative ganglia situated there. The results in pancreatic insufficiency in diabetes are varying, as the state of the still functioning part of the gland can hardly be estimated, and the site of the gland, especially in fat patients, is not always easy to fix. I have seen undoubted improvements in cases of diabetes of mild character, but I have not yet had the opportunity to cure and observe them long enough to state any definite effect. At all events this treatment is very promising, as it is an etiological treatment as far as the gland is concerned. If we have to consider diabetes just as well as exophthalmic goitre not as a disease of the gland but primarily caused by a lesion in the brain, this treatment will probably be not so efficient. At all events it is recommended to be applied in all cases, where insulin is given, as we know by physiological experiments, that the function of any cell or gland can be increased by diathermy.

Easier to control is the action upon the suprarenals, as the statement of the blood content of adrenalin is relatively simple and here the stimulating action of the secretion is proved. Clinically we observe the rise of the blood pressure and tonisation of the sympathetic nerve system.

The most extended use has been made until now of diathermic gland stimulation in hypo-function of the sexual glands of men and women. And here the clinical control is easy enough to prove the efficiency. I may allude to a few cases of oligomenorrhoea and infantilism of the female genitals: Miss V. W., 25 years old, until her 18th year normally menstruated. Then pneumonia and pleuritis. Since then amenorrhoea. Five diathermic treatments local to the ovaries, in sixteen days. At the twentieth day, for the first time in seven years, menstruation occurred. Treatment has to be done twice weekly for a different length of time, depending on the gravity of the case. Especially good results are obtained in cases of oligomenorrhoea, which caused sterility. The stimulation of the glandulary secretion and the deep hyperemia, produces a remarkable increase of the size of the uterus in cases of insufficient development.

In the same line are results obtained in obstetrics. In cases of missed labor and weakness of contractions where pitruitrin injections were without effect, confinement was induced by diathermy.

In men the endrocrinal incitation by diathermy is proven by therapeutical results in sexual neuhasthenia, spermatorrhoea, in many general troubles caused by diseases of the prostate, in infantilism, impotence and azoospermy.

I refer to two cases. (1) Mr. R., age 38 years. Since 8 years old very abundant perspiration of the whole body, especially at surprises. Married, two children. Suffers attacks of debility, headache, loss of appetite, rumination and for one year, nearly daily spermatorrhoea. One intra-urethral treatment by high frequency currents. Since that day no spermatorrhoea occurred; after a week all troubles were gone. (2) An x ray physicist, 31 years old, married, was impotent seven months. No pollutions; sperma, thick fluid, containing plenty of sperma crystals but not one spermatozoon. After twelve diathermy treatments of the testicles, the twenty-ninth day for the first time many lively moving spermatazoa were stated. Erections present since one week before. Further three treatments with ten days interval each. After two months two more treatments. Ten months after the beginning of the treatment his wife became pregnant; the child was delivered normally, grew strong and normal and is now three and a half years old, and it has not shown any signs of abnormal development.

We may pass pituitary gland and the parathyroids as well as the pineal gland and add some remarks on multi-glandular trouble or cases in which the nature of the trouble could not be stated.

Angioneurotic edema: Mr. B., 28 years old, hands and feet swell suddenly, especially in a warm room, easily chilled, no appetite, constipation, hemorrhoids, headaches, slight dilatation of the heart, accentuation of the second tone of the aorta, slight irregularity, radial artery very soft, pulse small, no varicosities. Ten treatments of high frequency currents; general state all right, appetite came back, swellings occur very rarely in the following months and to a very small degree. Mr. L., 17 years old. Swelling of the face and the hands by influence of cold or of sunlight, strong itching. High frequency therapy healed in ten days' treatment. No recurrence. In these two cases treatment was applied locally and to the thyreoidea.

Asthma: G., boy 5 years old. Many whistling sounds, frequent attacks of coughing which are combined with a torturing and constant dispnoea. The shortness of breath is increased to asthmatic attacks at the slightest corporal straining. After three weeks of diathermy treatment he feels absolutely well. Coughing has completely disappeared, very little breathlessness in straining; in resting, not at all.

Mr. A., 35 years old, suffered since 23 years old from racking pain in the right eye and jaw. Often glimmering in the eye. If such an attack occurs, nausea, hiccoughs and vomiting. Since eight weeks nearly daily attacks. The corneal and palate reflex diminished. Diathermy treatment. After the second treatment free from pain. After three weeks dismissed without any trouble except sometimes a slight feeling of cold to the right side of the head.

I have seen many cases of migrane cured in one treatment with no recurrence for years.

To conclude, we may state that considering the enormous complication of the combined action of the vegetative nerve system and of the endocrinal glands, there are many cases in which for the actual standing of our knowledge we cannot analyze sufficiently the exact mechanism of the trouble and the real etiological factor. But we are able to recognize some types as the thyreotoxical, the hypothyreoidal, the pituitary, the type of sexual insufficiency and some more which give us directions for the therapeutical plan. We have in diathermy an energy to our disposal which has a specific vagotonical or sympathetic tonical efficiency, depending on the way we apply it, and which can be put in action directly upon the different glands in the direction to incite their specific secretion. By activating one gland we can vary the bal-

ance of the whole endrocrinal system and so withhold a pathological increase of another antagonistic gland. So we have many ways to produce all different actions we want to make use of in a special case. I believe that the further development of our knowledge in the line of using physical therapeutic methods for treatment of the troubles in question will be of greatest value in therapeutics. But I believe that just as great may be the value of these resources in clearing up many questions of endocrinology and of the function of the vegetative system, as the physical energy simplify the experimental conditions. For instance, diathermy application means sole application of heat with a very far-reaching possibility to localize its effect. This means a great advantage in comparison; for instance, to the application of adrenalin, or pilocarpin which once injected to the body are out of our control regarding the place where they are going to act. We may expect unlooked-for therapeutical and experimental results.

THE USE OF THE MONOPOLAR CURRENT IN SKIN BLEMISHES*

A. E. SCHILLER, M. D.

DETROIT

When the surgical diathermy currents are properly used in the treatment of skin blemishes, there is no method more satisfactory both to the doctor and the patient.

The various types of current obtainable from a diathermy machine for surgical purposes we can divide into first, a monopolar current, which is taken from the Oudin tap; second, a bipolar surgical current which is taken from two of your taps, with your meter either in, or out of the circuit; third, an indirect method of diathermy in which the patient becomes one with your condensor couch and you use a needle or pointed applicator to draw the current from the body to the point to be treated.

The surgical use of the monopolar current has been called electro-desiccation and that is a term coined by William L. Clark of Philadelphia. Dr. Clark has probably done more work with the monopolar current than any other man in the world.

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What is desiccation? Desiccation is dehydration of the tissues and subsequent cell destruction. As I have said, we take the current for this from the Oudin pole of the diathermy machine. The Oudin pole is usually the pole here (indicating) or the center pole on the large machine there. This furnishes a high ratio, high frequency current and it must be a high ratio, high frequency current because if it isn't you can't overcome the resistance of the skin to the current.

The amount of destruction produced is directly proportionate to the product of the voltage and spark gap. I will demonstrate that to show you just why that is and how that is.

The production of the heat is due to the resistance which the tissues of the body offer to the passage of this current either through the medium of air or the tissue itself. Here we can consider an important point. Abnormal cells have a lower vitality than normal cells. This fact is well known to all. Therefore, abnormal cells will be destroyed and healthy tissue left

comparatively uninjured by the same amount of current.

TYPES OF CURRENT

Your bipolar current has high amperage and low voltage. Your Oudin current has low milliamperage and high voltage. It takes lots of pressure to do the work. Suppose you have a multiple spark gap machine or a machine like this. You don't need to use all of the gaps; one gap is enough. For very superficial work one gap is better than a lot of gaps, unless you have almost perfect control of your spark gap. In that case you can use all of your gaps and cut them down very fine, and I am going to show you how to test your current with a little simple test that can be performed in a tenth of a second.

The milliampere meter is not used with a monopolar current and you can't measure your milliamperage, but you have to depend on your own senses in getting the right amount of current, and it is so easy that once it is shown to you there is really no trick to it.

Your control of this type current is about as perfect as anything could possibly be. Your control of the bipolar current is not as perfect, because in a bipolar current there are certain factors that enter into consideration and you may think you are getting one thing, whereas you are getting quite another. I had that amply demonstrated to me when Nagelschmidt was here. He was our guest at the hospital and we had a half dozen nurses who had moles and warts on the face. Nagelschmidt used nothing but bipolar current. He used practically no spark, at least the spark didn't show in the gap, and yet each one of these six girls has got a very indefinite ringed scar, showing an undesirable depth penetration. At about the same time I took three other cases and in one case removed seventeen small cystic growths from the face. In the one case where we went down into the cutis vera the scar is perfectly colorless and cannot be seen unless you get right up close to it. The rest scarcely scarred.

I contended at that time, and I contend now that in the treatment of skin blemishes where perfect cosmetic result is desirable, and perfect cosmetic results are always desirable, you have to use the monopolar current to get them.

Another type of case where it is important to use a monopolar current because of the same reason is on the mucous membrane. In leukoplakia, a white patch on the mucous membrane of the mouth, there is no other method that gives as good results as electro-desiccation. I say this advisedly, because I have used ultra violet ray, radium, and other methods and when I got through the patient still had leukoplakia. There is no other way to destroy the patches of leukoplakia except by diathermy current. It destroys it perfectly and the results are excellent.

About a month ago I treated a venereal wart inside the urethra. This is a peculiar place to find this type of wart. I think this was the first one I had seen, and in eight days after desiccation the lesion disappeared and the urethra had completely healed without constriction. Whether there will be any constriction of the mucous membrane in six months, I don't know. It doesn't look as though there would be. This result is due to a gradation of the size of the spark and care in application of the same.

I don't know whether you want to get this down. I jotted down a few points and I thought these points quite important in monopolar technique—to my mind absolutely all there is to it. Beyond these points you may read volumes on technique, but I doubt very much whether you will get a whole lot more out of it.

SUPERFICIAL DEHYDRATION

1. Scrub the area thoroughly with green soap and water. Now maybe you don't want to

do that. Maybe you would rather use alcohol. The first time I used alcohol on a lesion on the face, I was trembling with eagerness to get at the treatment. I had my nurse there, and the machine on, and everything ready, and bang! a big flare, and the patient's face was in flames. You need only one experience of this kind and you are cured. I had two. In removing a large wart, the nurse painted a lesion on the scalp with iodin and alcohol, and we had a head full of flames. Fortunately, alcohol when it flames, is not hot to start with, but it was scarey, and as a rule the patient doesn't return for another such experience.

2. If you have a mucous membrane lesion you can paint it with 2 per cent butyn solution and in five minutes, using a little pressure, you will have sufficient anesthetic for any mucous membrane work you may want to do. On the skin it doesn't do to put on novacain, or butyn, because it doesn't penetrate; so you can either inject directly underneath the lesion, or you can block the tissue.

Where there is a large area to work on you had best block for nerves. For instance we had something like forty warts on a hand. In this case I preferred x ray to anything else, but the patient refused x ray and we simply blocked the nerves at the wrist. This was a very easy thing to do. We took a needle, started on one side of the wrist, and then went across to the other side, and the tissue was blocked off—at least sufficiently so that we could go right ahead; because when we work, we work very, very fast. There is slight room for tinkering. Get your technique down and then go ahead and do it. When you are through, your results are either good or bad, according to how carefully you have followed a proper technique.

By the way, when you are using a preparation of novacain with adrenalin, you will often find that immediately following an injection the patient will say, "Doctor, my heart is going like this (indicating)." That is your adrenalin, not the novacain, and thirty drops of aromatic spirits of ammonia will be sufficient to control it.

3. The use of a fine spark, using a needle that is well controlled by either a hand or foot switch. We will go back to the subject of needles later.

4. The point of the needle is held from several millimeters to several centimeters away from the lesion. Now this is when you are doing dehydration—very superficial dehydration. If you want to do deeper work, place your needle within the tissue. You can go down about as far as you want to. Go right straight through the tissue. Get your current through the tissue and you will be able to desiccate well and with a control that is impossible in bipolar work.

5. A shower of sparks flows on to the lesion, which is thus desiccated.

6. An alternative method is to place the patient on the autocondensation couch and connect the couch with the Oudin current, which is monopolar. The patient becomes a part of the condensor and you discharge the condensor by means of a pointed applicator.

For finer work, for work on the cornea, for work on a patient where it is absolutely essential to leave no scar, this is an ideal way of doing the work. Your control is absolute. You can give the patient more spark or less spark by using the other hand as a rheostat and putting one or more fingers on the patient. You can get the current out by placing the needle on the patient and this needle is in your hand and not connected with any other electrical apparatus. In other words you form one end of the make and break of a spark gap; your patient forms the other end. They are part of the condensor which is discharged through you and the means of the spark breaker.

QUESTION: That is called the indirect method?

DR. SCHILLER: Yes.

7. Immediately after treatment a crust forms and it is part of good technique to leave the crust in place. Regeneration will often take place underneath the crust. I always instruct my patients that immediately after bathing, the lesion be patted dry and be sprinkled with powdered boric acid. The lesion must be kept dry. If you don't keep it dry, you are going to have a slough. If you have a slough, you are going to get a deeper penetration than you intended to, because nature is going to react to the insult and small cell infiltration will appear in the tissue as a measure of defense. This will result in a hard ring which isn't going to quite absorb, and you are going to have either a light scar with a raised edge, or a little ring form that won't look any better than the lesion you took off.

8. There are certain types of lesions in which a deeper desiccation is indicated—rodent ulcers, small epitheliomata, senile keratoses (those little brown spots which are a little roughened, with edges which start to curl in and a pearly border). These are pre-cancerous types. The best technique here is to first desiccate; then to curet away the debris; then seal the wound with a small desiccating spark. The same thing in mucous membrane lesions of that type. Get as much tissue away as you can and curet right straight down into the derma; because otherwise the result will be poor.

9. Surgical asepsis is important. I don't mean to say you have got to wear a gown and mask and cap, but at least take the precaution of having your needles boiled afterwards and before, and use the ordinary surgical asepsis that you would use in any minor operation, and you will never have any bad results from infection.

10. *After Treatment.* Where you curet away lesions and then seal them, we found the best thing to do was to use a 2 per cent dichloramine-T in oil at first and a 1 per cent hypochlorite solution after that. This leaves a nice, clean surface that will heal very readily.

11. One point in the treatment of lesions where you suspect a beginning malignancy is not to stick your needle in the center of the lesion and work toward the outside. If you suspect diphtheria you give antitoxin—at least you should. And if you suspect a malignancy, take the precautions that go with malignancy. If it is suspicious enough to make you think of malignancy, then it is suspicious enough for you to take every precaution. Insert your needle in the skin, slanting in slightly toward the center, and "circumvallate" the lesion with a ring of fire. Then go ahead and destroy it and destroy it thoroughly; curet away the debris; then seal your base and dress it.

The types of cases that can be treated and that we have treated are:

1. The pigmented nevi and hairy nevi. In the hairy nevi always remove the hair first, because if you don't, the patient will have a nice, long beard.

2. Telangiectasis. In the telangiectatic area, when they are arranged like a spider web, place the needle in the center of the lesion, and it is gone for good.

3. Senile keratosis. Those are the brownish, roughened areas that we see in people advanced in age and sometimes in people not so advanced in age, simply a senile change in the skin. Every time you see a lesion of this kind, destroy it, because it is pre-cancerous. These can bedestroyed with a very superficial desiccation and destroyed permanently without scarring.

4. *Plantar Warts.* You have all had some experience with plantar warts. Occasionally they clear up very brilliantly with x ray treatment. We had a case recently who had gotten no result by x ray. We desiccated and got beautiful results. They are very easily taken care of by desiccation, but in case of a plantar wart always warn your patient that the base of that lesion is not on the skin. It is down underneath, and if you remove the surface of the wart it does absolutely no good. You can't get results unless you go down to the base.

5. *Filiform Warts.* Filiform warts will shrivel up and disappear and won't give you much trouble.

6. *Lupus (tuberculosis of the skin.)* I think these do as well with desiccation as with any other method. Lupus is a very stubborn disease. If you want to destroy thoroughly, use desiccation and follow by the quartz lamp therapy, including general body radiation by the air-cooled ultra violet ray.

7. *Neoplasms.* All types of neoplasms can be handled very satisfactorily, but you must remember that in the large neoplasm radium and x ray are also to be used.

ULTRA VIOLET IRRADIATION OF ORAL AND NASAL CAVITIES*

JOS. GALE, M. D.

CHICAGO

ACTION OF ULTRA VIOLET LIGHT ON MUCOUS MEMBRANES

The action of ultra violet light on mucous membranes has been a much debated subject. We must not fail to recognize the all important fact that since mucous membranes are covered with secretions the ultra violet effect will depend on the character of those secretions. The two chief factors are the density of the secretion and the bacterial content. On all mucous membranes, ultra violet is bactericidal. Finsen's early work proved this, and the more recent experimentations of many investigators have added much to our knowledge in this field. Koch, as early as 1890, showed that tubercle bacilli were killed by light. Russell cites the work of Browning and Russ, who (in 1917) threw the spectrum of a tungsten arc light through a quartz spectograph on to a gelatin plate inoculated with micro-organisms. Sharply defined vertical areas resulted, some showing growth, others showing none. The region shown to be most actively bactericidal lay between the rays of 2960 Angstrom Units and 2100 Angstrom Units. Wave lengths slightly longer than 2960 Angstrom Units were lethal after much longer exposures, or at a higher temperature. The sharp lines of demarcation suggested selective absorption, and this was proved by examining absorption spectra of suspensions of organisms which were used in the former experiments. The region of the rays absorbed by the bactericidal emulsion corresponded almost exactly to the portion of the spectrum of most marked bactericidal power. (Russell).

It has been demonstrated also that ultra violet light destroys the toxicity of secretions and bacterial toxins, but requires a longer time to effect such action than to destroy the organisms themselves.

The effect of an ultra violet radiation of mucous membranes of the pharynx, if conducted

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for a period known to be less than half of the blistering time of the burner, would be a bacidal one. Carried beyond this time, the effect would be destructive with a marked reaction occurring within twenty-four to forty-eight hours with subsequent ulceration. Yet the same or even dose applied to the nose would give no such reaction. This is due essentially to the density and thickness of the layer of secretion over the mucous membrane.

TECHNIC FOR PHARYNGEAL AND LARYNGEAL IRRADIATIONS

For irradiating the pharynx (for tonsillitis, for instance) a quartz rod is most efficient. Hollow metal cylinders with quartz prism ends are not as satisfactory as solid quartz applicators. Care must be exercised when irradiating the tonsils not to expose the soft palate, as frequently marked reactions occur in this part from very small exposures. From our present knowledge of the subject, all that can be hoped for is a surface effect. The ultra violet rays will not penetrate deeply, and therefore are not indicated in cryptic tonsils which are deeply infected. If for some reason surgery is contraindicated, good results can be obtained by opening the tonsil crypts, painting the exposed surfaces of the tonsil with a solution of mercurochrome, and irradiating them daily or on alternate days with ultra violet light from the water cooled lamp, using a solid quartz rod. The time of each treatment can be increased as the patient's tolerance is increased.

For the larynx, a Sampson laryngeal applicator is employed. It is curved in such a way as to emit the rays directly into the larynx. If the patient is properly instructed as to breathing while the applicator is in place, and if the applicator is not held in contact with any of the parts, the patient is able to tolerate an irradiation for as long a period as desired. The chief indication for laryngeal irradiation is laryngeal tuberculosis, and from the reports now available, it would seem to be one of the best methods we have. It should be remembered, however, that laryngeal tuberculosis calls for body exposures from the air-cooled lamp and other general measures that are known to be of value.

INTRANASAL IRRADIATIONS

Several points of importance must be mentioned in connection with intranasal ultra violet radiations. First and foremost is the cleansing process. Because of tenacity and density of the nasal secretion, one cannot look forward to any favorable effect on the nasal mucosa unless the nasal membranes are first cleansed of their mucous coating. For this purpose several measures may be employed. Argyrol tamponage, according to the method of Dowling, is quite satisfactory. Or a saturated solution of magnesium sulphate may be used instead of the argyrol. Nasal irrigation is quite satisfactory, but the objection to it is that tissues in some patients have a tendency to become water-logged.

After this initial procedure, irradiation may be carried out either by the indirect method or direct, as suggested by Hollender and Cottle. The indirect method involves the use of the quartz applicators. There are several styles which are made for the nose and the operator must select the one best suited for the case. The direct method is one whereby no quartz rods are employed. Both sides of the nose may be irradiated at once by means of a bilateral nasal speculum attached to the water cooled lamp. If for some reason it is desired to irradiate the posterior part of the nasal chambers rather intensively, the direct and indirect methods may be used, first giving direct irradiation, then indirect. Patients are able to tolerate as much as twenty minutes by the direct method without ill effects. However, this must not be taken to imply that such long irradiations are the rule.

As has already been mentioned, the action of ultra violet on the nasal membranes is a sur-

face action. If preceded by argyrol tamponage, it has a good effect in cases of rhinitis, and in local catarrhal infections of the naso-pharyngeal tract.

The effect of ultra violet light on sinusitis, unless the quartz applicator can be brought in contact with the sinus mucosa, is rather doubtful. Where the raying can be performed by immediately exposing the part to be treated, good results are usually obtained.

The use of anilin dyes preliminary to irradiation of the nasal membranes is quite satisfactory in some instances. Mercurochrome, eosin, acri-violet and acriflavine have been employed by us at various times. The action of the light is probably enhanced by the preliminary use of the dye. There may be some other action which we cannot as yet explain. It may be that the penetrating properties of the rays are increased and that the rays extend further, at least as far as the dye coats the membrane. These are merely conjectures, however, and need to be proved by careful observation.

All local irradiation should be supplemented by general body radiations.

DOSAGE

The question of dosage, although already brought to your attention at numerous times during the course of this paper, needs to be emphasized rather strongly. There is no set rule, and the experience of one need not necessarily be the rule of another. As Sampson has very correctly pointed out, the most important rule is to know the blistering effect of the burner. This must be determined first. The time of treatments for the various parts to be treated can be gauged only by experience in the work. Over-treatment must be avoided as it is frequently hazardous. It is far better to undertreat, at least, until such a time that the tolerance of the parts are definitely known.

DISCUSSION

Dr. E. N. Kime: I would just like to ask one question. I would like to know what difference in erythema results from preliminary shrinkage of the turbinates with cocain, adrenalin or petrolatum as is usually done in nose and throat treatments, that is for coryza and hay fever and that sort of thing before the use of the light.

Dr. M. H. Cottle: I should like to say just a word about the oral and nasal cavities. Dr. Gale has spent a long time in doing this work and he has described to you very concisely many facts in one mouthful, which is a little hard to swallow.

There are one or two things I would like to touch upon. We hear of treating, for example, hay fever and such conditions and also acute coryza and chronic nasal infections with ultra violet in the nose. For two years we did that and I am very safe in believing there was not a single instance of beneficial effect from the use of ultra violet in that method, as suggested by all writers, and I think it is very important to realize that the nasal mucous membrane, be it the secretion or other things, is entirely different from any other mucous membrane in the body as far as its resistance to ultra violet absorption. A lamp that will produce a blistering and ulceration and very painful destruction in the soft palate in fifteen seconds, will have absolutely no effect on the nasal mucous membrane in fifteen minutes or even in thirty minutes, and yet the same lamp will produce a blister on the skin in one minute. There must be a reason for it. That we have just an ultra bactericidal action in the nose is of very little advantage and it is essential that in order to get benefits from ultra violet in the nose the irradiation be extensive and be down as near as possible to the mucous membrane.

In addition to what Dr. Gale suggested, you can make the nasal mucosa prepared for ultra violet by the use of diathermy. Diathermy applied in the form of condensor electrodes produces a watery secretion from the nose and in that way produces an indirect washing out of the nose and at the same time produces a shrinkage. Therefore, diathermy must be added as a preparatory step in the treatment of ultra violet in the nose.

The use of anilin dyes is something which we must consider very carefully. Anilin dyes do not increase the activity of ultra violet on the part. Anilin dyes absorb ultra violet rays and transform them into some other form of energy. Part of that energy may be ultra violet light so that you have a continued surface action of ultra violet light, but more especially ani-

lin dyes and other substances transform the enrgies of ultra violet into lower frequencies. In other words, it may turn into ordinary light.

One other point in the use of applicators that we have for our work: We must have applicators to approach the larynx and so forth. There are two kinds of applicators—solid quartz and metal. The solid quartz applicator may be of two types. They may be curved or they may be prismatic in order to get the ultra violet around the corner. A true prismatic quartz applicator will give an emission of about 95 per cent of the total ultra violet possible with that particular size electrode applicator. A bent applicator will give only about 60 per cent. On the other hand, a metal applicator gives very much less, and especially so because the nickel plating of these hollow metal applicators with a terminal quartz piece is on the outside. The silver and nickel plating is on the outside of the tube and it is needed on the inside of the tube.

The best ultra violet reflector in metals is zinc, and in order to get the maximum effect from a hollow cylinder, you would have to have it all lined with zinc, and with a zinc reflecting surface you would get only about 40 per cent of the possible ultra violet.

With the ordinary, coarse metal applicators that we have, possibly the efficiency of the lamp is cut down to 20 per cent and maybe less. I can only say one thing, that as Dr. Denman has done in practice, we believe the same thing, that you can increase the local lethal effect of ultra violet by the systemic biologic effect when air-cooled ultra violet is applied to the body.

I think the use of ultra violet in eye work must be again mentioned for completeness. In the treatment of corneal ulcers and chronic conjunctivitis ultra violet is very beneficial.

Dr. Ira O. Denman: I presume that the essayist stressed the fact that these conditions requiring local application of ultra violet ray in a state of infection should not be looked upon as purely local conditions until all possible systemic infections have been recognized and eliminated. In other words, what I mean to say, to put it a little different, is that the usual case requiring local application of ultra violet for infections of the nose and throat is apt to require systemic treatment and additional corrective dietary or stimulating effects of ultra violet by a lamp. We should not drift into the careless habit of treating local lesions, infections as local conditions purely. That is the only thing I would like to add.

Dr. Lurie: As I stated this morning, my experience with ultra violet radiation is wholly about the jaws and head and dates back some six years. Some six years ago I undertook the then quite prominent treatment of hay fever by the ultra violet and I have quite an interesting series of cases that were treated at that time and which I have continued to treat to the present day, and this series of cases has been subjected to exclusively local radiation about the nose, mouth and throat.

You may be surprised when I tell you that the first case I treated is well, has no more hay fever and hasn't had for two years. Of course that case encouraged me. Since then I haven't had such very good results, but there are a number of them in which this is a typical outline of the history.

My more recent cases seem to give a similar history. I am not trying to disparage the observation of those who have been finding that general radiations are necessary. I am going to try them. I hope they will add to what I have been able to do, but I am just reporting what I have done. The majority of these cases received no diathermy or no heating of any manner so that it was purely the result of local irradiation. I have a pet theory on hay fever and I am going to leave it with you, that although pollen seems to be the exciting factor in hay fever, I doubt that the tests to determine just what pollen is responsible for hay fever is necessary because in my mind the pollen is just a vehicle for some filtrable virus or perhaps some ultra microscopic organism that we have not been able to differentiate up to the present time, but which is easily devitalized by the ultra violet.

Somenoe asked me, when I expounded this theory, "Why is it that pollen that is out in the open air and subjected to a great amount of ultra violet doesn't become sterile before it reaches the nasal cavity?"

My answer to that is that dust in pollen doesn't get ultra violet in all its surfaces and that there are some points that are still able to carry the germs which I mention.

Dr. Edward E. Edmondson: I agree with Dr. Lurie in reference to the local treatments of the ultra violet by the water cooled lamp with the solid quartz rod applicators, first in the nose high up and low down, giving treatment direct, and then going up behind the soft palate and treating the nose in that manner, and then using the metal tube with the quartz terminal on the pharynx.

I have done that all this past year with hay fever cases and regardless of the etiology, in a short while, sometimes within a week, we would get nearly the complete cessation of symptoms.

We worked on one case two weeks before we got any apparent change. In nearly all these cases we got blisters from the short application to the nose. We got them in the pharynx and in the nose. My machine does that and today those cases that we have been treating since hay fever began (down South where we have a lot of pollen, a lot of golden rod and all that sort of thing) are handled in that manner. I might add that we give them diathermy. The applicators are made to fit perfectly on the nose and back of the head. For a period of time I give that treatment and I have also found that will reduce the amount of sneezing and aid in part to partial sterilization just as we do in other things when we pasteurize them.

I also give general body irradiation. The nude body is placed on the couch, front and back, and I give them forty minutes per day. I increase that one minute per day.

It might interest you to know that a case of trench mouth which I treated down there earlier in the season has been practically healed after being treated for a week or more. The patient came to me with puffiness of gums and bleeding. The men who went across and were in the trenches know what it means. I treated this woman daily with a solid rod applicator to these gums and followed it all around the mouth inside and out. Then I disconnected the machine and had an opening about the size of a 25-cent piece that usually contains the metal tube and I placed that close up to all the mucous membrane within and without the alveolar processes both above and below, and nearly all the bleeding had been stopped and all the swelling and pain disappeared on the fifth treatment. The woman now lives in Chicago.

DR. JOS. GALE: In answer to Dr. Kime's question, we use drugs in the nose for shrinkages. We also use them for cleansing.

DR. KIME: If you use cocain and follow with ultra violet, do you have to use more or less to get the same effect?

DR. GALE: I am surprised Dr. Edmondson gets blisters with ultra violet in the nose. We have used it from five minutes to twenty minutes with no effect as far as pain and blistering is concerned. To my mind you don't have to use any more because of the cocain.

You gentlemen who are using local ultra violet in your treatment of hay fever and getting results, I am sure you would get much better results if you used general irradiations in conjunction with the local.

1102 Argyle Street.

THE INDICATIONS AND TECHNIQUE FOR GALVANISM*

JOSEPH E. G. WADDINGTON, M. D.

DETROIT

Galvanism is a therapeutic application of a galvanic or of a direct current. A galvanic current is a unidirectional continuous current; and is only evolved from a battery of cells. With such a chemically evoked current, the older electrotherapists—to whom high frequency, ultra violet, and other now popular and numerous electrotherapy modalities were entirely unknown—obtained remarkably excellent results.

The direct current, the universal D. C. current of commerce, that which is furnished the electrotherapist in the so-called galvanic or direct current apparatus, is *not* a galvanic current, technically speaking. It is a unidirectional but not a continuous current. Owing to its mechanical mode of generation, it is a pulsatory or hesitant current, its graph showing a straight but dotted, broken line in contrast with the straight but unbroken line of the galvanic. The direct current, however, is precisely similar to the galvanic in strictly chemical effects, but—on account of its pulsatory or intermittent character—is incapable of being administered in so large a dosage as its smoother prototypic congener. Due to this fact, and this fact alone, the therapeutic results derivable from the average commercial direct current source do not

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equal those attainable from a strictly galvanic one.

In an endeavor to more nearly approach the desideratum of a smoother, practically continuous or non-pulsatory current most of the manufacturers are now quite satisfactorily remodeling their direct current machines. In my subsequent remarks concerning galvanism, it is to be understood that I am referring to the use of the improved direct current apparatus and not to galvanic cells or to the old type, essentially coarse commercial current.

The direct current—unlike the high frequency and wave currents—is essentially chemical in its primary or direct effect. Being a low voltage current, and therefore incapable of overcoming much resistance, it is invariably applied biterminal. Each terminal is termed a pole, and each pole or contact possesses diametrically opposed chemical and physiological effects. The positive pole gives an acid reaction; is a vaso-constrictor; and popularly considered sedative and pain relieving. The negative pole gives an alkaline reaction; is a vaso-dilator; popularly considered as a stimulant and therefore contra-indicated in the treatment of painful conditions.

It should be clearly appreciated that these strictly polar or chemical effects are only in supreme evidence in the more immediate contiguity of polar contact; and that the characteristic polar expression becomes diminishingly evident the farther away from the respective contacts. It is this somewhat localized, direct, polar effect that has been emphasized by most writers, but while extremely important, the less recognized indirect or interpolar reaction is equally, if not more, important. While both direct and indirect reactions may be in evidence when treating superficially located lesions, it is the indirect, interpolar reaction that is importantly evoked when treating deeper structures.

Let us first review the direct polar action and indications. To prevent misunderstanding, it is thoroughly recognized that the extent and precise nature of the pathology involved shall determine whether galvanism be only an adjuvant to other indicated therapy, even possibly surgical.

Acute inflammation, involving joints and muscles especially, is an indication for the sedative, pain-relieveing application of positive galvanism. Acute ovaritis, hemorrhagic conditions in the female such as menorrhagia, metrorrhagia, are conditions for which the vaso-constrictive positive pole is valuably indicated. In gynecological conditions, the active electrode may be placed over the abdomen, and the indifferent larger one under the back and even thus secure quite a polar effect, as the soft abdominal muscles offer very little resistance to the deeper penetration of the current. However, an obese contour will naturally lessen the direct polar effect; and it is always preferable, whenever possible, to place the active electrode intravaginal, thus obtaining a powerfully effective localization of the current.

Due to the polar effects of galvanism, we are thereby enabled to drive minute particles or ions of certain chemicals into the tissues. Sodium salicylate on the negative pole, or quinine bichloride on the positive pole, has been successfully employed in a few cases of painful nerve involvement; but as these chemical ions only penetrate very superficially, it is useless to attempt to utilize them in the treatment of deeply seated lesions. Zinc sulphate in 1 per cent solution, and even weaker, may be successfully applied from the positive pole in the treatment of chronic, indolent ulceration. Friel, of London, has brilliantly demonstrated the efficacy of this salt for electrical ionization in cases of otitis media in children. The French advocate a solution of potassium iodide on the negative electrode for softening and removing superficially situated scar tissue. Here in the States

we use sodium chloride quite as successfully; and it is a question whether the softening, vaso-dilative character of the negative pole is not the all sufficient factor in these results, as evinced in the electrolytic absorption of stricture, urethral and otherwise, by means of a bare metal olive on the negative pole.

Professor Leduc has clearly shown us the predominance and celerity of hydrogen and hydroxyl ions in the tissues, and the absurd impossibility of expecting any deep penetration and effect of extraneous and slower ions applied from the electrodes.[1] Valuable as this superficial ionic effect of a certain few chemicals may be, far too much importance has been erroneously attached to the medicament and not enough to the effect of the current itself.

On account of this electrolytic or ionic dissociation, zinc and copper electrodes are quite valuably indicated in the treatment of various infective degenerations of the mucosa, more especially and conveniently evidenced in the uterine and vaginal cavities. Copper ions are more styptic in action, while zinc ions are considered as being more antiseptic and less irritating, though either metal may be quite satisfactorily substituted for the other. How many of us have curetted innumerable uteri in a vain endeavor to remove the cause of that ubiquitous and unpleasant symptom common alike to the virgin and the prostitute, to the matron and the occasionally accomodating spinster, the result of acute as well as chronic inflammation; of hyperemia and congestion: leucorrhoea. If the mucous effusion be the result of a cervical erosion, a bare zinc or copper electrode, suitably shaped to contact against the affected area, is indicated with the positive pole, and a ten or fifteen minute treatment should be given with a current of from 10 to 30 ma. This may be repeated every fifth or seventh day as required. It is always advisable when using these uncovered metal electrodes, either intra-vaginal or intra-uterine, to at least attempt to comfortably administer as thorough a treatment as possible, as each subsequent treatment is apt to be somewhat less effective but increasingly irritant.

In most cases of erosion, we will find the cervical canal also affected, which will require an intra-uterine electrode, preferably not insulated at the tip, as it will not be necessary to insert beyond the internal os. If a chronic endometritis be in evidence, a copper or zinc electrode of convenient caliber and length will be inserted to the fundus, an insulated tip in this case being valuably indicated to prevent undue localization of current. According to size of electrode, from 5 to 30 ma. may be quite safely and beneficially employed for ten to fifteen minutes. Some patients are surprisingly impervious, subjectively, to the current; others may complain of slight cramping during the treatment, and still a few others will complain of severe cramps a few hours later. It is advisable to limit the strength and duration of treatments according to the sensory reaction, though, if expertly administered, there should be no serious sequent complaint.

Uncovered zinc metal electrodes applied on the positive pole are not apt to stick to the tissues, but copper ones will; these latter should therefore be amalgamated, prior to each treatment, by dipping in 10 per cent sulphuric acid and then in mercury, which will thereby obviate the necessity of otherwise reversing polarity prior to withdrawal of the electrode.

That particularly unresponsive condition, membranous dysmenorrhoea, is quite amenable to intra-uterine treatment with a metal electrode employed on the negative pole; this has a softening, disintegrating action upon the affected tissue. As hydrogen gas is evolved during the course of the treatment, quite severe cramps may not only evidence themselves dur-

ing the seance, but be even more severely in evidence later. It is advisable to use a perforated, hollow electrode to provide for free egress of the gas; or to only give a mild current of short duration, possibly 10 ma. for five minutes. This treatment with a closed electrode should prove brilliantly effective in certain cases of sterility, where gas inflation of the tubes would be otherwise indicated; and it is at least an easily available test for patency of same. For vaginitis, specific and non-specific, a carbon electrode wrapped in cotton moistened with 1 per cent zinc sulphate solution and applied from the positive pole, can be used two or three times a week with current of comfortable strength, usually averaging 25 ma. for ten or fifteen minutes.

For the treatment of deep and comparatively deep pathology, it will be necessary to invoke the interpolar reaction of galvanism. This demonstrably non-specific polar effect manifests itself physically as heat—more or less intense according to milliamperage used—and physiologically, by normalizing metabolism and functional activities of the tissues directly permeated by the current. The indications for galvanism—the interpolar reaction, very closely resemble the indications for medical diathermy; galvanism, however, will be found to have an appreciably more trophic effect, but is not so markedly a thermal relaxent.

In previous writings I have mentioned my clinical conclusions that galvanism, though valuably indicated in some acute conditions, is more generally applicable for the treatment of chronic pathology. The availability of smoother D. C. generators only serves to accentuate this opinion, because, to successfully arouse an adequate interpolar, thermal response within the deeper tissues, and even within superficial, direct current of exceptional smoothness is essential in order to attain required dosage.

Neiswanger used to teach us that electricity is an unequalled equalizer of nervous force; and it is as such an equalizer of functional activity that interpolar galvanism acts beneficially in many conditions requiring such aid, even though somewhat dissimilarly expressing their dysfunction. Professor Turrell, of Oxford, believes it is reasonable to suppose that this "ionic massage" produced by the current traversing the tissues may be responsible for the physiological activity thereby aroused, but—being a difficult matter to prove, prefers to ascribe the therapeutic virtues of galvanism chiefly to its easily demonstrable thermal production.[2]

Previously I have stated that the positive pole is popularly considered as a sedative and the negative as a stimulant. This is only partly and dangerously true. In acute inflammatory conditions, the vaso-constrictive effect of the positive pole will be physiologically sedative; but when the acute inflammatory fires have died out, but left certain connective tissue changes, especially evident in the chronic forms of neuritis, and other adhesively constricted pathologic changes, the vaso-dilative action of the negative pole will then be found a physiological pain reliever, as well as a cellular and nutritional stimulant. Further, though the interpolar reaction of somewhat widely separated electrodes or pads will be more deeply evident, and irrespective of the polarity at the superficies, nevertheless, the specific polar effects at the respective current terminals should be borne in mind, and the indicated positive or negative, sedative or stimulant contact be localized over the area particularly requiring such polarity effect. In this manner we obtain a direct influence upon the sensory skin terminals additionally to a reflex, indirect, deeper effect.

A case of chronic dysmenorrhoea or of functional amenorrhoea would call for the negative electrode over the abdomen and the positive at the back; whilst a chronic menorrhagia or metrorrhagia would call for just the reverse polarity connections.

While electrical application of chemicals will prove of no avail, and even the indicated

polarity itself but feebly efficacious, long continued seances of 40 minutes, with a comfortably strong current, will be found refreshingly serviceable in the treatment of that stubborn neuritis, sciatica, provided it be a true involvement of the nerve and not a reflected symptom produced by some distant and extraneous pathology.

External administrations: Applications to skin surfaces, are almost invariably to be made by means of well heated, thoroughly moistened pads, usually consisting of cotton or asbestos of not too thin and not too thick a consistency, about one-half to three-quaters of an inch thick, and of various convenient sizes.

The one outstanding important factor—among many others—is close apposition of electrodes, as even pin point spaces will give rise to unpleasant sensation and possibly sequent desiccation. Electrodes should always be placed as nearly opposite one another as possible in order to concentratingly cross-fire the current, but they should not be localized—if possible—so as to unnecessarily include delicate organs or tissues not pathologically affected. To more concentratingly restrict the polarity effect to the indicated area, the active electrode should be as much smaller than the indifferent one as conveniently possible; do not forget, however, that the larger the electrode, all things being equal, the more current can be comfortably and safely administered; and also the active electrode should invariably be placed as near to the affected area as conveniently possible.

The important contra-indication to galvanism is never to apply it in suspected cases of retained pus, despite a well recognized authority to the contrary. "Render unto Caesar the things that be Caesar's" is not only good Christianity, but also good physiotherapy; and both profession and laity will progress more amicably and healthfully if each member of the medical profession does not attempt to disastrously substitute his own—but non-indicated—pet therapy for some colleague's differing—but more clearly indicated—treatment.

SUMMARY

Galvanism, unfortunately, is not a popular modality, due entirely to non-recognition of its value.

The study of galvanism is not quite so simple as that of some of the other modalities; and the polarity effects of the current have been unduly stressed to the almost entire exclusion of its equally and even more important interpolar reaction.

This latter reaction, which is essentially, though not to be considered entirely, a thermal one, is trophic in character; a normalizer of local metabolism, and a cellular stimulant.

Galvanism, especially of negative polarity, is more often and valuably indicated in chronic pathology.

Both positive and negative poles are pain relieving in indicated conditions.

Galvanism possesses a direct or polar (chemical) action, and also an indirect or interpolar (thermal) reaction, each one, however, interdependent upon the other.

In a recent review of a work on electrotherapy, the reviewer took the author somewhat to task because he had discussed galvanism prior to high frequency and other modalities. The reviewer's opinion was that galvanism was such a difficult subject that one should—so to speak—coax the trembling physiotherapist along with the comparatively simpler modalities and later, perhaps, unfold the difficulties and glories of this old fashioned but poorly and incorrectly understood current.

I still believe that galvanism is the practical and intelligent key to electrotherapy, and I have endeavored in the space of time allotted

to me to at least open your eyes and mind receptively to a consideration of this invaluable modality, and trust I may have at least explanatively interested you and provided scope for a free and full discussion.

REFERENCES

1. Leduc, Stephane: *Electric Ions and Their Use in Medicine.*

2. Turrell, W. J.: *The Principals of Electrotherapy and Their Practical Application.*

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PRE- AND POSTOPERATIVE PHYSIOTHERAPY IN HALUX VALGUS*

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LOS ANGELES.

The literature on halux valgus is so voluminous, the theory of its production as well as the operative therapy so extensive that I do not dare to venture into the bibliography on this subject. I intend only to touch upon a phase in the treatment of this affection which would reduce the frequency of operative interference and would greatly alleviate postoperative disability of the foot; a disability which is as a rule temporary, but at times, also permanent.

Whether we adopt the purely mechanical or the muscle theory of production of this defect, in other words whether we blame the modern shoe with high heels and a sole narrower than the forefoot requires, or we claim that, as a weight-bearing deformity, the plantar and anterior leg muscles have lost their efficiency from long continued standing or walking, the fact remains that a halux valgus is an accompaniment of other foot defects, such as valgus heels, flattened anterior and longitudinal arches, hammer and curled toes, calluses and corns. The removal of the latter, the procuring of commercial supports or "bunion rights or straights" may be helpful, but all these measures are only palliative; they will never restore the big toe and the rest of the foot to comparative normalcy which should be the aim and purpose of therapy.

PREOPERATIVE PHYSIOTHERAPY

Without fear of contradiction from my medical friends, I may state that patients with incipient halux valgus are better cared for by the chiropodists. They institute physical and mechanical treatment early and undoubtedly help the patient very much by restoring a better anatomical configuration to the foot arches and by replacing the toes, the small ones as well as as the big toe, into better alignment. This treatment, let us call it preoperative physiotherapy, because operation may have to be resorted to if maximum results are not obtained, consists of the following steps:

1. Preparation of the foot by a stimulating remedy.

2. Massage, manual or mechanical, manipulations and exercises.

3. Retention of the correction by means of strapping, padding, support or bracing of the toe or toes.

(1) The preparatory step aims at the softening of the contracted tissues, i.e. the tendons, fasciae and capsules, especially the external lateral of the valgus toes. This is attained by the aid of a stimulating agent which produces an artificial local hyperemia. The agents of choice are: radiant light and heat, hot air baths or douches and the immersion bath. The electrical modalities for this purpose are mainly the negative galvanic current and diathermy. They may be applied by means of specially shaped electrodes to fit the foot outline and the

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big toe joints or may be delivered through a foot bath with the respective electrode in the water. In connection with negative galvanism, chlorine or iodine ions may be introduced into the tissues by the electrode, or the hyperthermal bath method. In either way, the negative pole is the active and the positive the indifferent one which is attached to a remote part of the body, preferably the thigh.

(2) The foot is now massaged, vibrated and manipulated. The effect of this step is to dissipate the effusion which has been artificially created by the previous step. The tendons and contracted capsules are stretched and the muscles, particularly the abductor hallucis, increased in function and strength. The most important item of this step is the exercises which the patient is instructed to perform and which consist in the adopted flatfoot and toe-gripping movements. I prefer to have the movements performed while the feet are immersed in hot water. For toe exercises I advise the picking of small pieces of rubber hosing out of the water, thus performing active resistive exercises with the toes.

(3) The above mentioned therapeutic steps result in a more limber foot after each sitting. The position of the toes, including the big toe, and the shape of the arches have become somewhat corrected. This correction must be retained. This is possible by means of adhesive strapping, padding of the arches, and by additional bracing of the toes to a straight splint. Splinting for the daytime is usually impossible since the foot could not fit into the shoe, but splinting of the big toe over night to a toe-straight is advisable and, in many instances, beneficial. The selection of rubber, felt or metal supports can be left to the discretion and ingenuity of the individual worker; it should be remembered, however, that the valgus position can be corrected and the foot supported when the prop is well shaped behind the metatarsal head of the big toe. In my experience, metal lends itself best for this purpose if shaped over the plaster negative of the individual foot.

Many mild halux valgus deformities may by these means be restored to comparative normalcy. If the obtained correction is not sufficient, the physiotherapeutic procedures have been the most useful and perfect preparations of the foot for any operation to follow. Whatever type of operation is selected, postoperative physiotherapy offers the only assurance for a perfect result.

POSTOPERATIVE PHYSIOTHERAPY

One factor stands out preeminently as a postoperative procedure and that is: The time of immobilization and rest of the operated toe should be reduced to a minimum and motion of the joints, the metacarpo-phalangeal as well as the carpal joint, begun not later than five days after the operation. I continue splinting of the toe for about ten days, but allow daily passive and active motions of the joints. After 10 days the foot and toe is subjected daily to physical measures and to massage. This treatment is continued until perfect conditions are restored. The object of postoperative treatment is to prevent loss of muscle function and to guard against recontracture of soft tissues.

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HEMORRHOID DESICCATION*

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When we come to the average physician on the firing line of everyday practice, the thing he is primarily interested in, the thing he wants to know above all as to any particular method or procedure, is How? Tell him this in language that is not overly cumbersome, and if the procedure sounds good to him, he will soon "see for himself." That is, if he is the progressive type of physician always on the qui vive for anything newer and better; and to his credit it must be admitted that the physician interested in physical therapy is usually progressive all along the line; he wants to be right up in the front rank of the procession.

On this basis then, we will attempt to briefly outline the "how" of a hemorrhoid desiccation technic, which has given us much satisfaction. Not original in that sense; more a synthetic technic built up from ideas here and there, intermingled with a few of our own, this "how" may perchance stimulate others to still further simplify, to still further improve and perfect.

Operation is performed under local anesthesia. The bowels should have been emptied well beforehand, preferably with a simple enema. About a half hour prior to operation two tablets of allonal are given by mouth. We prefer the lithotomy position. After clipping hair about the anus, this area is well swabbed with mercurochrome. Then four spots, anteriorly, posteriorly and laterally about a half inch from the anal margin, are touched with pure phenol on a small cotton swab. Using a 10 c.c. or larger hypodermic syringe tipped with a fine steel needle of about 1¼ inch length, our field of operation is anesthetized. An anesthetic solution suggested by Martin of Detroit has given us much satisfaction. This is composed of 2% novocain, 1% antipyrin, and 1% (1/1000) epinephrin, of which from 2 to 4 ounces may be used. We use on an average perhaps 2 to 2½ ounces.

Protected by a finger cot the right index finger is lubricated and gently introduced into the rectum, and hooked over the sphincter as a guide. Our hypodermic needle may be introduced through the phenol touched skin spots with scarcely any discomfort, and carried directly upward parallel to the rectal wall until its point impinges gently upon the gloved finger in rectum. As the needle is carried upwards gently, the anesthetic solution is slowly forced into the tissue ahead. Withdrawn, the needle is re-introduced into a fresh phenol skin spot, until the four injections have been made. With the right index finger in the rectum during this time as a guide, it is shifted about to meet each successive injection. As the sphincter becomes infiltrated with anesthetic, it quickly begins to relax and is soon soft and patulous. Dilatation may be facilitated by introducing the left index finger also; and with the two index fingers back to back, the sphincter gently stretched to a sufficient degree for our work. This should not be done roughly, or too rapidly as it will cause pain to the patient, and perhaps a tearing of muscle fibers. Anesthesia is perfect in about ten minutes, by which time the hemorrhoidal area will be well relaxed and hemorrhoids everted. In the female, this eversion may be assisted by the gloved finger through the vagina. If hemorrhoids do not present sufficiently, we may apply a small vacuum cup over the anus, and with slight suction completely evert hemorrhoids, so that they are out in the open and easy of attack. It is well at this stage to care-

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fully inspect the operative field so as to determine beforehand with a general survey, the size, condition and general extent of hemorrhoidal involvement. Usually the largest and most prominently presenting hemorrhoid mass is next gently grasped with suitable forceps, and tested for degree of anesthesia. If any untoward sensation is left, it is well to balloon the hemorrhoid mass with anesthetic, and this is especially desirable if much skin seems involved, as this will avoid a pinching sensation when the hemorrhoid is grasped in a clamp. With traction by the grasping forceps, the pile mass is clamped across its base with a regular pile clamp or other suitable heavy clamp forceps. Next the pile mass is trimmed off with curved scissors close to face of clamp jaws. Formerly we simply desiccated the whole pile mass in jaws of clamp and then released this pile and proceeded to the next one. It was found, however, that considerably more current was required to desiccate the entire mass, and our patient had a correspondingly more undesirable after reaction. Likewise the retention in the anal outlet for several days of necrotic and sloughing pile masses not only caused a noticeably bad odor in this region, but also set up a good deal of mechanical irritation. By eliminating the pile mass at the start we not only avoided these undesirable features, but were able to desiccate right across the base of the pile with absolute certainty and with a minimum of current. For the desiccation proper we use the Oudin current (monopolar) with a good, fat spark of about ¼ inch length. Experience is the only guide to use as to amount of spark, as our meters do not measure this current as it does the bipolar. The entire operation should be done under foot-switch control of current, and the current delivered with any good insulated handle needle. An ordinary chuck type of handle, holding a plain straight sewing needle, or a surgeon's half round needle give good results. Our needle point is introduced into the pile base held between jaws of the pile clamp, and the current kept on until desiccation is noticed. The operator holding the pile clamp notices little heat, and the patient rarely a twinge of heat if our anesthetic has been introduced properly. The needle is withdrawn and re-inserted about an eight of an inch away from the first insertion, desiccation employed as before, and so on across the base of pile. Next the severed pile base is lightly and rapidly fulgurated. This seems to give a sort of antiseptic, protective scab over the severed pile base. Before releasing pile base from clamp it is well to drop two or three interrupted ties of plain catgut back of the pile clamp jaws and pick up the ends of each tie with a hemostat. The pile clamp is now released, the catgut ties rapidly tied, cut short, and we are ready to attack the next pile mass. Placing these catgut stay ties in the base of pile takes but a few seconds, and insures against any possible pulling apart of the severed edges of skin and mucosa of pile base during repair process. They cause patient no discomfort, do not require removal, and we find a desirable feature in our work.

Each pile mass is similarly attacked in turn. With large external piles there is often considerable redundancy of skin covering, and in picking these up in grasp of pile clamp, it is well to extend our grasp well out to pick up some of this redundancy, otherwise skin tags may be left when the repair process is complete. This may not amount to anything except from a cosmetic standpoint, and of little import even in these days of the one-pece ablution garment of abbreviated fame, but our patient will notice these skin tags just the same, and find it difficult to let you convince him they are not piles with him still. Likewise in desiccation of skin, more current must be employed than to desiccate mucosa.

After each and every pile mass has been thus done away with, we should carefully examine digitally, and by direct inspection through the speculum to be assured no piles are left. "Cure" your patient of his piles and he is your

friend and well-wisher for life, but leave just one little budding pile or a little "inoffensive" skin tag, and he has something to hold against you in his mind's eye for quite some time perchance.

On completion of the operation a suppository of opium and belladonna is inserted into the rectum, and the operative field liberally greased with butesin picrate ointment and a suitable T bandage dressing applied. Two five-grain tablets of amidopyrin are now given the patient and he is ready to leave the table. The patient usually notices a slight burning sensation in the rectum for about a half hour after the anesthetic begins to wear off, which is followed by a feeling of heaviness and bearing-down in the rectum. The average patient is ambulant throughout, but with the neurotic, nervously exhausted, or aged and infirm it is best to have them resting on a couch or easy chair most of the time for a day or two after operation, when their usual activities may be gradually resumed.

Pain or discomfort after operation is readily controlled as a rule with amidopyrin, 10 grains three or four times a day if needed. Many patients, however, do not feel the need of sedative or analgesic medication, stating that the treatment has bothered them no more than the hemorrhoids previously. Where there is enough pain or discomfort to make for wakefulness the first night or two after operation, allonal may be substituted for the amidopyrin. For any actual rectal pain one of the opium-belladonna suppositories may be employed, or to check undue sphincteric activity after a bowel movement. The patient is put on full dosage of petrolagar with phenolphthalein at first, and this shaded down as bowel action becomes regular; finally petrolagar in diminishing doses is used along with proper dietary. By petrolagar usage internally the bowel contents are kept soft and lubricated, and with application of ointment externally, bowel actions are very easy. Occasionally resort may be had to a simple enema or to a glycerin-saline injection if the bowels seem a trifle sluggish, the first few days. Constipation should not be permitted, as passage of hardened fecal masses will cause much pain and discomfort. Hemorrhoid cases of long standing are often nervously exhausted in addition, and energetic treatment should be directed to this also.

Convalescence as a rule is rapid and uneventful, and our end results all that could be desired, not only from a functional standpoint, but from a cosmetic as well. Leave a skin tag or two and it is very difficult sometimes to convince the patient that all of his hemorrhoids have been removed. With the technic used, hemorrhoids are done away with and the integument about the anus left smooth and normal in appearance.

The treatment is abundant and may be easily performed in any well equipped office or clinic, so that the patient is saved the expense of hospitalization. This means something to the doctor also, because after a big hospital bill has been met, little is left and the doctor waits for his fee. From an economic standpoint, little time may be lost from the patient's usual avocation, while under the common hospitalization and surgical operations for hemorrhoids, a stay of ten days to three weeks in hospital is not at all uncommon. The operation is all done under local anesthesia, thus avoiding the discomforts and possible dangers of general anesthesia. Our current serves as an efficient sterilizing agent, and even in this grossly contaminated operative field, infection is something we do not see.

We do not decry surgical treatment proper, nor condemn the various injection technics; they all have their place under the sun, but in general it will be found that electro-surgical treatment is far more satisfactory both to patient and to operator. The technic briefly described above is giving us excellent results, but it is hoped that further simplification and improvement may be made, and stimulation of thought and effort in this direction must be the major raison d'etre of these few observations.

RADIUM EMANATION IN BENIGN LESIONS OF THE UTERUS*

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It is no longer necessary to apologize for one's boldness in bringing forward radium as a curative means in non-malignant conditions of the uterus. While considerable difference may exist in the opinions of individuals as to the merits of radium treatment in this particular application, its successful use has been so many times recorded, and the achievement has so often been a triumphant refutation of some Cassandra, who argued wisely and at great length upon the dangers and uncertainties of applying radium to the hemorrhagic and fibromatous conditions of the uterus, that its champions now far outnumber its detractors.

Nevertheless, there are a number of perfectly well established contra-indications to the use of radium in the non-malignant uterus, and there is an ever present danger that these reasons for resorting to other methods may not be thoroughly comprehended, or being understood may yet be ignored. It therefore behooves those who are most enthusiastic about the treatment to be the most cautious in employing it, and it is also their duty to lose no occasion to point out the restrictions with which the therapy should invariably be limited, and to insist that success can only crown the efforts of him who considers each case individually from every angle, before treatment of any kind is undertaken. This last point would, of course, be equally well taken in regard to any kind of radium therapy, but when we are dealing with benign lesions of the uterus, it is particularly important to emphasize it, even to the risk of tiresome reiteration.

What then should the ordinary practitioner, confronted with a case of intractable uterine bleeding, either due to fibroids or to some less prominent causal factor, do in order to assure himself that he is doing the best for his patient, either in giving her the radium treatment, or in withholding it in favor of some other physiotherapeutic measure, or surgical intervention? The answer to this is relatively simple, and quite within the accomplishment of anyone who is at all qualified to practice medicine. He should make a *thorough* physical examination. Not content to investigate the uterine pathology alone, he should scrutinize thoughtfully all the other organs and take note of their anatomic condition and physiological abilities. The heart, the lungs, the kidneys, should all be gone over and "tested out," not the mere perfunctory examination which is usually deemed sufficient, but an honest searching inquiry into the patient's physical stock in trade, so that he may know just what reserve he has to fall back upon, and what dangers lurk unnoted, but ready to rise up with dreadful portents as soon as any mistake is made in the curative measures undertaken.

These admonitions will probably be regarded as "old stuff," not worth the time it requires the printer to set it up, but the truth is that many who should know better have fallen into the way of regarding radium much as they would salve or liniment—as something which can be stuck in, or spread over, a lesion without any fuss or bother, and will thereupon work a miracle. Now the decision to use radium should be reached after careful consideration of all the factors, in precisely the same way that we would determine to employ surgery, and once that decision is reached, the entire procedure should be protected with all the safeguards and carried out with exactly the same precautions

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that would be thought necessary were a surgical operation to be performed. Until all those who employ radium for any curative purpose come to realize this, we are bound to have records of failures which will be blamed, not as they should be, upon the carelessness and inefficiency of the therapists, but upon the dangerous properties of the curative agent.

If the patient's vital organs are in such condition as to make it a reasonable certainty that she can undergo the strain of radium treatment—and, of course, it is well understood that those whose physical state absolutely precludes surgery or the administration of any kind of anesthetic, may be perfectly able to receive radium treatment—we should next take up the definite contraindications in the particular condition we are considering, that is, benign lesions of the uterus. If there is a fibroid present, its size, location, structure and state of development must all be noted and duly weighed. If it lies beneath a serous membrane or is prominently pedunculated, it is so obviously well adapted for surgical removal that only in patients whose other organs were in such a pathologic state as to render surgery impossible, would there be any further thought of using radium. This is generally true, also, of any fibroid which is wholly within a ligament. It should be surgically excised if possible, and this is the case likewise with most large tumors of this character, that is, if they are of sufficient size to rise above the umbilicus, or about the dimensions of a gestation of eighteen weeks' duration. Parenthetically it may be said that there is a marked difference of opinion about the practicability of using radium on large fibroids. Kelly of Baltimore, one of the foremost of American gynecologists, stated fully five years ago that he did not hesitate to use it even when the growth was very large, and that his results had been uniformly good. He has not found many to agree with him, however, and especially when the tumor has attained a size sufficient to cause symptoms of pressure, some more rapid method than radium therapy will bring about better results.

The age of the patient is another very important consideration. It is perfectly established that radium is sterilizing in its effects and that if used in any quantity in the uterus of a woman still in the child-bearing period, the outcome may be permanent abolition of the generative function. Because of this danger of sterilization many therapists decree that radium should never be used in women under forty years of age, unless it is desired to produce a permanent arrest of menstruation, or at least there is no further desire for offspring. While this age limit may perhaps be rather high, the danger of sterilization is far too great to permit the matter to be passed over lightly, and no patient should be permitted to undergo the treatment until both she and her relatives are made fully acquainted with even the remote possibilities, and express themselves as willing to abide by an outcome unfavorable to a continuance of the generative function. It is of course, superfluous to mention that radium should never be used in the existence of pregnancy.

As many of the most severe cases of intractable uterine bleeding occur in patients in the fourth decade of life, this question of possible sterilization bobs up very frequently, and no rules can be laid down as to the handling of the individual patient. It is altogether an ethical and social question, which must be put and answered by those most nearly concerned. Of the value of the treatment to eradicate the condition there must be quite another line of discussion. Small units of dosage greatly lessen the dangers of injury to the functionating intrauterine tissues, and the adnexa, and improvements in the manner of application have made the treatment still less hazardous. Yet the danger of producing a permanent precocious menopause still remains, and must never be forgotten.

Finally, and perhaps, most important of all, the diagnosis must always be fully established. There must be no doubt whatsoever that we are dealing with a *benign* condition. Now that so many diagnostic aids lie ready to hand it seems inexcusable that errors should be made, yet this so frequently occurs that it is necessary to stress the importance of making absolutely certain that malignancy is not existent. If there is the least suspicion a diagnostic curettage should be done, and the scrapings submitted to careful pathological examination.

We have now seen that intrauterine treatment with radium may be safely undertaken in women over forty who present uterine fibroids which have not attained a size greater than an eighteen weeks' pregnancy, associated with bleeding, providing they are not below the serous membrane or peduculated, and that no focus of inflammation, either present or recent, can be demonstrated within the uterine cavity. Radium is equally applicable in subjects of similar age who suffer from excessive menstrual flow, or irregular uterine hemorrhage, either menopausal in character, or from some obscure cause not readily determined; or in inflammations of the cervix or its interior, which give rise to excessive vaginal discharge. Radium remains also, as an alternative to surgery in those patients who cannot be subjected to operation, or refuse it for any reason.

TECHNIQUE OF TREATMENT

The patient having been selected, the question of the best manner of dealing with the problem she presents must next be answered. As we are dealing here only with the use of radium emanation it will be unnecessary to consider various methods of applying radium within the uterine cavity; only the author's method will be detailed.

The patient receives every attention which would be bestowed upon a surgical case. She should be placed in a hospital if possible, and undergo the routine preparation for major surgery—full elimination from bladder and bowels, shaving and disinfection of the external genitals, and thorough cleansing of the entire field of application. Absolute immobilization during the entire period the applicators are in the uterus is essential, for should they become displaced serious damage might be done to the healthy mucosa.

Adequate filtration of the container which carries the radium emanation into the uterine cavity is of the greatest importance. For a twenty-four hour application a filter of platinum .5 mm. in thickness must be used if it is intended to deliver 1000 millicurie hours. The individual uterus must be measured beforehand by means of a sound, and the size of the applicator gauged to fit the particular case. The filtration must be such that not only are the caustic beta rays eliminated, but any secondary radiation given off from the platinum screen, is taken care of as well. This is accomplished by additional screenage of one-tenth of a millimeter of aluminum, and the entire applicator is finally encased in a metal rubber, providing filtration which effectually prevents all caustic action and eliminates the dangers of necrosis and subsequent sloughing with fistula formation, which has in the past been the chief drawback to the employment of radium within the uterine cavity. If it is planned to allow a 48-hour period for the delivery of the desired dosage a platinum screen one millimeter in thickness should be employed, the remaining filtration being the same as for the shorter period.

The applicator is always carried well in beyond the internal os and up as far as the fundus. Immobilization is secured by suturing the lower end of the container to the cervix, holes through which the sutures are to be passed having been provided with this end in view. It has not been found necessary to pack the vagina with gauze, but in order to avoid accidents the

operator must have a thorough knowledge of the anatomical location in which he is working, as well as considerable skill in the manipulation of his appliances.

The results of this treatment have been highly gratifying, and the gratitude and satisfaction of the patients thus saved from the ordeal of operation and long hospitalization, is not the least of the therapist's rewards. There is every prospect that within a comparatively short time, radium treatment of benign uterine lesions will become as well accepted a procedure under proper conditions as radium treatment of uterine malignancy has already become.

DEMONSTRATIONS OF DIATHERMY TECHNIC*

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While the proper technic when giving diathermy treatments is important, it is only one of several features necessary for the successful treatment with the high frequency current.

First and most important, before any treatment is started, is a correct diagnosis, which requires a thorough examination in order to treat any case intelligently. It is very necessary that we find the cause of the trouble and eliminate it if we are to be successful with our treatment.

To illustrate my point I will cite a few cases treated, and give the cause as I found it:

A school boy was referred to me for diathermy treatments for fibrosis of the elbow following a fracture of the lower third of the humerus. This case did not respond satisfactorily to diathermy. On investigation I found his tonsils diseased. I suggested to his physician that they be removed. After their removal there was a decided and rapid response to diathermy, massage and manipulation, and the case cleared up completely.

A young lady with neuritis of the leg was referred to me for diathermy treatments. On examining this patient I found she had a severe colitis which was apparently the cause of the neuritis, and which it was necessary to clear up in order to obtain permanent results with diathermy.

Another was the case of a man with acute arthritis of the ankle, referred for diathermy treatments. When I examined him I found him to have an unerrupted wisdom tooth entirely surrounded by infection. Of course this had to be removed if we were to be successful with our treatments.

A man came in for treatment for neuritis of the arm. When looking him over, I found, by means of the x ray, that a dentist while extracting a tooth two years previously, had broken off a root and in the attempt to remove it had forced it up into the antrum. When we opened up the antrum, it contained about a half-teaspoon of pus, this root, and two small polypi which were the cause of the neuritis. After proper drainage of the antrum and diathermy through the arm, the neuritis rapidly disappeared.

A young lady with high blood pressure was referred for auto-condensation treatments. When I looked her over I found her tonsils badly diseased. I coagulated her tonsils and gave her auto-condensation three times a week. Her blood pressure came down within a few months

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from above 200 to 140, and her general health improved accordingly.

I believe these few cases have shown my point—that technic is only one of the important factors in the successful treatment of any case, and have made clear to you the necessity for a *thorough* examination.

I caution you not to make a hasty snap-shot diagnosis, as you may overlook some pathological condition that would have a decided influence on the ailment being treated.

If the patient is absorbing toxins from any source whatever, his vitality will be below par and he will not respond as he should to treatments. As an illustration, I find arthritis or neuritis will very often be slow to respond to treatment, and have a tendency to recur, if the patient has some infective process going on which lowers his vitality, and from which he is absorbing toxins, such as pyorrhea, abscessed teeth, diseased tonsils, colitis, colonic stasis, etc. Clear up these foci of infection and notice how much more rapidly the patient responds to the treatment.

The method of applying electrodes in diathermy varies with the parts affected. Variations of methods depending on the contour of the anatomy and the pathology present will suggest themselves. If the chest or abdomen is to be heated up, two pieces of mesh or two plates are used. If a hip is to be treated, you can use two plates, or one cuff above the knee and a plate on the back, but with this latter method the patient should be in a sitting position.

The cuff and salt water method can be used to advantage in treating an ankle or wrist, or both ankles or both wrists at one time. For an elbow or knee I prefer the double cuff method and always include four to six inches above and below the joint, as the pathological condition usually extends beyond the joint.

When you are using the cuff method, there are two points you must remember, or your results will be unsatisfactory:

First: You must turn on the current very gradually—as in all sedative treatments—taking from three to five minutes (depending upon the amount of current used).

Second: Each cuff should be four to six inches from the joint treated, and the limb kept as nearly straight as possible. I want to repeat that each cuff should be from four to six inches from the joint depending on the size of the joint being treated, and that you must turn on the current very gradually.

If you adhere to these two points, you will find that you have heated the superficial and deep tissues and bone throughout. Whereas, if you neglect either of these points you will probably get the greatest amount of heat on the surface instead of within the deep tissues and bone, where it is desired.

In treating prostatitis and seminal vesiculitis, I use a prostatic electrode in the rectum under the prostate, and a 4x5 mesh over the pubis, having both electrodes well soaped before applying them. Use soap on the rectal electrode, as the jelly lubricants dry up from the heat and the electrode sticks to the mucous membrane and the patient will complain of soreness for a few days following the treatment.

In pelvic cellulitis, dysmenorrhea and amenorrhea, use a vaginal electrode with mesh or block tin as an indifferent electrode above the pubis. In menostasis in young girls and when it is inadvisable to use the vaginal electrode, I use a 6x6 mesh posterior, and a 4x6 mesh anterior, held in place by large rubber sponges.

When there is a scar in the median line I use a bifurcated cord and an indifferent elec-

trode on either side of the scar, as scar tissue has a poor blood supply and heats up rapidly, not having sufficient blood supply to disperse the heat.

In giving sedative diathermy or auto-condensation treatments, the current should be turned on and off very gradually, taking from three to five minutes, depending upon the amount of current to be used.

First we estimate the amount of current to be used before starting the treatment, and set the rheostat accordingly so we will secure this amount of current when all points of the gap are open, but without having them open too wide at the time the maximum amount of current to be used is reached. If the spark gap is open too wide we do not get a smooth flow of current—it is more of a rough or Faradic type. Rather, open the rheostat wider before starting the treatment, and it will not be necessary to open the gap so wide.

In a given case the amount of current to be used is estimated. Set the rheostat accordingly so this amount of current can be secured without having the spark gap open too wide when the maximum amount of curent is being used. Have the spark gap entirely closed. Next, cut in the current by opening the main switch.

Now start the treatment by gradually opening the spark gap until the milliammeter reads 100; wait 30 seconds, open to 200; gradually turn it on 100 at a time, waiting 30 seconds after each 100, and continuing thus until the milliammeter registers the amount you wish to give. Continue the treatment for the length of time desired. In this way you secure a smooth flow of current throughout the entire treatment from start to finish.

The current has not been broken during this turning on process. To turn off the current, reverse the turning on process, but take only about half the time.

I use stimulative diathermy in very few cases. I find I use sedative diathermy in fully 95 per cent of cases treated with diathermy.

When giving auto-condensation treatments, the patient lies on the auto-condensation pad, which is hooked up to one of the d'Arsonval binding posts. The other cord is attached to a 3x6 or 4x6 mesh, which is placed so that it covers the lower border of the liver, the gall bladder, the cystic duct, the several bile ducts, the head of the pancreas and the pancreatic duct, instead of having the patient hold the auto-condensation handle in his hands, which often causes the wrists to become tired and ache from so much current passing through them; there is no advantage in having the current pass through the arms.

On the other hand, there *is* an advantage in having the current pass through the liver, gall bladder and pancreas. The concentration of heat in this region increases the blood supply, causes a thinning of the bile—thereby increasing the flow—and aids in emptying the bile ducts and the gall bladder, all of which is desirable in chronic conditions.

I always begin the first auto-condensation treatment with a small amount of current for a short period of time, say 300 milliamperes for 15 minutes, and gradually increase the amount of current and time of treatment. Pay strict attention to elimination by giving laxatives, and have the patient drink six to eight glasses of hot water daily, starting with two glasses one hour before breakfast.

In catarrhal conditions or infections of the gall bladder, congestion, inactivity, torpidity or insufficiency of the liver, multiple arthritis, diabetes mellitus and diabetic ulcers or where I want to hasten metabolism, I find auto-condensation of marked value.

DISCUSSION

DR. W. B. WALLACE: The great point that we have had put before us in every paper that has been read this morning and in our President's address has been diagnosis. I want to stress that also. With a wrong diagnosis the treatment will probably be wrong. There may be times when you may have to treat symptomatically, but also try to make your diagnosis and then select the modality that will give you the best result.

This morning in one of the other rooms there was a paper in which they spoke of wrong technic due to a wrong diagnosis, such as myocarditis or an angina pectoris. We must be very careful to make a correct diagnosis of those things.

Dr. Knotts spoke of the method of turning on the current. Two years ago some man here made a statement that he just turned the current on, pulled the switch right out, and he certainly had a large number on their feet as soon as they could get there. I think it is absolutely wrong. The current should be put on very mildly at first, as Dr. Knotts has said, especially if you have a neurotic patient, because if the patient gets the least bit of pain or a little bit of excessive heat, he is going to complain and he may not come back to the office and you will have killed your treatment right there.

Another thing I want to speak of is testing your machine out. Every time you give a treatment with diathermy or galvanism or with the sine, try your machine out to see that every control is set at zero, otherwise you may shock a patient. I remember a patient I had in which this occurred. The machine had not been closed off. If we make it an absolute point to close the machine off, that won't happen. We should close it and then every time make it a habit of testing the machine, otherwise we are going to send so much current through that we will cause trouble.

The doctor spoke of treating the prostate with diathermy. I think that in addition he can use the sine current to follow that and use it with the same electrodes that he is using with his diathermy.

Making your electrodes so that they fit the body if the patient moves is one of the most valuable things, I think. I had that brought home to me only about two weeks ago in our clinic. I was treating a brother-in-law of one of the doctors and he was taking quite a heavy amount of current in diathermy, and I was out of the room. I was just in the next room. I had told him to shut the machine off if it got too warm. He turned and as he turned he raised himself from the electrode and he had a burn three-quarters of an inch wide and about three inches long. Luckily he happened to be a relative of the doctor and he is coming back; otherwise I don't think that we would have had him back.

I saw an arrangement this morning that I think would be a very good thing for those treatments and that was a band with an air bag in it. You put the band on the outside of your electrode and pump the bag up to the degree of tightness that you wished and that electrode would absolutely stay there. Another thing I want to speak about and that was spoken of over in the surgical room is the putting on of the bandage to hold the electrode. Don't get it too tight, because if you do, with the diathermy the tissues are going to become enlarged and it will become painful and you may have to stop the treatment and release that.

DR. JAMES C. ELSOM (Madison, Wis.): I would like to ask the doctor a question about what he calls stimulative diathermy. We know, of course, that one of the standard text books on electrotherapy speaks of stimulative diathermy and sedative diathermy. Personally I don't know what stimulative diathermy is. I wonder if any of us know what stimulative diathermy is or do we ever use it. I know, of course, that the theory is if you turn on the current suddenly to its full capacity and turn it off with equal suddenness, you are supposed to get what is called stimulative diathermy. But is it diathermy? I think it is not. We all agree, of course, that the way to give diathermy is to turn it on gradually, increasing the dosage and afterwards turning it off gradually. That is the sedative diathermy.

I asked one of these itinerant lecturers once who was discussing this subject why he did that stimulative diathermy and why it was that he got his heat so suddenly. He said, "We don't get any heat."

I said, "Why do you call it diathermy if you don't get heat?"

That was a year ago and he hasn't answered me yet. Isn't it about time we drop the term sitmulative diathermy? I think the proper term is direct diathermy and indirect diathermy. Personally, I can't see that we ever have any use for this stimulative diathermy, and I believe "there ain't no such animal."

DR. KNOTTS (Closing): I want to thank Dr. Wallace and Dr. Elsom for their discussion of my talk. In answer to Dr. Elsom's question, what do I call stimulative diathermy, and do any of us know what stimulative diathermy is, or do we ever use it—I say yes, we know what it is, and we also use it when it is indicated.

It is indicated when we want stimulation instead of sedation, when we want to stir up sluggish tissue as in non-union of fractures. We give less current for a shorter period of time, say fifteen minutes, instead of 30 to 40 minutes as when giving a sedative treatmet.

To give a stimulation treatment, first set the rheostat, then open the main switch; now open the spark gap rapidly instead of gradually, and have the gap wide open so there is a sort of sputtering as the current crosses the points of the gap. This causes a rough or Faradic type of current and is stimulating.

Several times during the treatment the current is interrupted by opening and closing the main switch. Give this treatment for about fifteen minutes only. By this method heat and stimulation are both produced; hence, stimulative diathermy.

Indirect diathermy is entirely different and the technic for giving it of course is different, and it is used in an entirely different type of conditions. It is used in some types of headache, and is given by having the patient on the auto-condensation pad, hooked up to the Tesla circuit and the operator passes his hands or fingers over the parts to be treated, thus concentrating the heat in the region being treated.

Some physicians prefer to use the d'Arsonval current by attaching the pad to one of the d'Arsonval binding posts, and the operator's arm to the other, and proceeding as described above.

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SURGICAL DIATHERMY IN THE TREATMENT OF SUPERFICIAL MALIGNANT NEOPLASMS*

JOSEPH K. NARAT, M. D.

CHICAGO, ILL.

Although a bewildering amount of work has been done on the subject of etiology of cancer, the pathogenesis of this disease still remains a mystery. Practically none of the clever hypotheses dealing with the causation of malignant tumors has been confirmed by careful investigation. Out of the amazing number of claims and suggestions based on experimental and clinical data can be extracted only very few sound conclusions of clinical value. Without the knowledge of definite etiology of cancer a causative treatment is at present out of the question.

Of late the administration of heavy metals, particularly lead, has been giving promising results, but this method of treatment is still in the experimental stage. A statement is justified that no efficient and harmless pharmacotherapeutic or biologic agents have yet been recommended for radical cure of cancer.

*Received for publication Aug. 24, 1927.

Hence from the dawn of medical history until present time the main principle in the treatment of malignant tumors is the attempt to remove them completely. Much dispute still arises concerning the selection of the proper method to accomplish this task.

For centuries the treatment of malignant neoplasms remained in the domain of surgery. In the last few decades several new procedures such as applications of thermocautery, electrocautery, carbon dioxide snow, x ray, radium, diathermy were added to our armamentarium.

In order to evaluate correctly the results of these methods it is necessary to analyze their advantages and disadvantages.

The surgical operation is the most convenient but the least recommendable procedure. Dissection exposes fresh surfaces of vulnerable tissue; bleeding requires sponging, clamping and

tying. Hence the danger of implantation of invisible cancer cells is great; the poverty of our success is thus explained. In addition to it, the cosmetic results are frequently very unsatisfactory, particularly when a wide excision—as it always should be practiced—is employed on exposed parts of the body.

These facts explain the unceasing attempts to find substitutes for surgery and to accomplish eradication of malignant neoplasms by means of other therapeutic resources.

Carbon dioxide snow usually produces soft scars and gives nice cosmetic results. It is suitable for removal of benign blemishes and less for the treatment of malignant tumors because the necessary depth of penetration and the dosage cannot be determined in advance. A zone of deeper situated tissues may not be frozen sufficiently and instead of complete destructon a stimulus may be produced which will cause a more rapid growth of the tumor.

Cautery is more popular in the field of physical therapeutics than the snow. The actual cautery produces carbonization of the tissues; the healing requires a long time and involves great expense and inconvenience on account of numerous dressings. The plugging of blood-vessels is not very firm and there is a danger of a secondary hemorrhage. The scars are unsightly. However, it must be admitted that the use of the hot soldering iron is very valuable in the eradication of large tumors where cosmetic results do not play any important role, e.g. in the cancer of the breast.

As this valuable therapeutic agent is rather clumsy, electrocautery is preferred as a substitute where the tumors are smaller and located on exposed parts of the body.

The above mentioned drawbacks of the actual cautery can be applied to a great extent also to the electrocautery.

When the therapeutic possibilities of x rays were first discovered they soon were pronounced as an important physical adjuvant in the treatment of superficial malignancies. Striking results were recorded by many authors. But the method has the following disadvantages: (1) The necessary dosage cannot be determined with exactness in advance. The cells of various types of cancer are susceptible to the action of x rays in a different degree and even two cases of the same type may show an unequal reaction. An insufficient dose may stimulate the growth; an overdose is liable to produce an ulcer extremely resistent to any kind of treatment except wide excision. (2) An x ray therapist with a wide experience is essential for the success of treatment. Such an expert generally can be found only in the great medical centers. The majority of patients with a superficial malignancy is not inclined to travel far for treatment, regarding the ailment as trivial. The situation becomes worse in cases where more than one sitting is required. All these factors contribute to a dangerous delay and the patients are seen by the physician when the time for the successful application of any method has long since passed by. (3) The effect of the treatment is not immediate. There are not sufficient experi-

Fig 1.—Epithelioma of the nose.
Fig. 2.—Rodent ulcer, right infraorbital region.

Fig. 3.—Squamous cell epithelioma, left infraorbital region.

mental or clinical data to indicate how soon the cancer cell becomes inactive after irradiation. A metastasis may form during the interval between the treatment and the death of the malignant tissue. (4) The financial question is very important. A very expensive armamentarium and the services of an experienced radiologist involve financial obligations which not every patient can meet. Hence the postponement of treatment until the radiotherapist has no fair opportunity to apply curative measures with satisfactory results. (5) A continuous, careful observation of cases treated with x rays shows that results on the whole are not as encouraging as they seemed to be a decade or so ago. The experience of the writer has been rather disappointing, in spite of the brilliant reports published by many authors. (6) One of the main factors in the crusade against cancer besides lay education is education of the medical profession. The necessary experience essential for early recognition and successful treatment of cancer can be acquired only by *treating* patients with malignant tumors and not by referring them to "cancer specialists" who are fortunate enough to possess an expensive x ray machine. If we had no other methods of treatment of malignant neoplasms except radiotherapy, this field of medicine would be necessarily confined to few radiologists with resulting lack of experience among the general practitioners.

Radium often gives excellent results in superficial malignancies. However, the disadvantages of this method are as follows: (1) It is sometimes difficult to adapt the radium containers to the size and shape of the tumor even with a suitable screenage. In extensive tumors it is necessary either to use several applicators simultaneously or to shift them from one place to another—a factor requiring much time and not securing an equal radiation in all parts of the tumor. (2) Applicators are dangerous for all those who look after them. (3) Physicians practicing far from large cities encounter difficulties in securing radium owing to its high price and great scarcity. Under these unfavorable conditions the application of radium is often delayed until the tumor is hopelessly advanced. The use of radium emanation and the method of insertion of needles or seeds is not always applicable. (4)The determination of dosage causes difficulties, especially in precancerous lesions where a good cosmetic result is essential. (5) The treatment is expensive and financial difficulties may influence the patient to postpone it.

In the last few years electrotherapy has received a great deal of attention in this country. The use of high frequency current—a relatively new acquisition in therapeutics—proved to be a very efficacious agency in the treatment of superficial malignancies. The term surgical diathermy is the commonly accepted term employed in describing the application of the high frequency current to the human body. While skepticism toward excessive claims is justified still diathermy properly applied has pronounced merits in the treatment of readily accessible malignant tumors. The employment of surgical diathermy has a very wide field, but this paper is limited to discussion of its application in superficial malignancies.

Fig. 4.—Rodent ulcer, right infraorbital region.
Fig. 5.—Multiple epitheliomas, right frontal region.
Fig. 6.—Rodent ulcer, right praeauricular region.

It is a regrettable fact that much confusion still exists in electrotherapy regarding terminology.

Two electrothermic methods are in use for eradication of superficial tumors and blemishes: desiccation and coagulation.

To accomplish desiccation a single electrode and a current of relatively high voltage and low amperage from an Oudin or Tesla terminal is used. The tumor is impinged with a sharp needle electrode attached to a suitable handle and the current controlled by a footswitch. The effect of desiccation is that the tissue fluids slowly evaporate and the area treated converts into a dry mass. Electrodesiccation is the method of choice for the treatment of small and superficial lesions of the skin and mucous membranes, such as warts, hairy moles, naevi, keratoses, cutaneous horns, superficial ulcers, etc., where good cosmetic results are highly important.

Electrocoagulation is the method whereby a heavier bipolar very penetrating current is employed. An active pointed or blunt electrode is held in contact with the tumor and an indifferent block tin electrode is placed somewhere in any convenient body contact.

It is unfortunate that the strength of the current to be used cannot be expressed in any units. The degree of destruction and depth of penetration of the electric energy are regulated by several factors—the size of the active electrode, the depth to which the needle is pushed, the volume of the current, the length of the application. Coagulation is the only proper electrothermic method to be employed in all accessible malignant lesions, such as squamous cell epithelioma of the lip, cancer of the tongue or buccal surfaces, etc.

As to the selection of the anaesthetic for electrocoagulation the author differs from the majority of writers in regard to the use of local anaesthesia. Traumatism of a needle near the growth cannot be overlooked. Implantation of malignant cells with the sharp point of the needle must be avoided. Furthermore, tissues saturated with the anaesthetic solution form a suitable medium for a secondary infection, with the resulting pain and disfiguring scar. Injection of the anaesthetic at a greater distance from the tumor minimizes these dangers, but the edema caused by the injection of the solution is very annoying, particularly on face. The malignant tissues are poorly supplied with nerves, hence very little sensitive. Fast work allows to eliminate the use of local anesthetics in most cases or to limit its use to highly neurotic and apprehensive individuals. A scopolamin-morphine injection is frequently preferred by the writer to the use of local anaesthetic. Prolonged operations required in extensive lesions may be carried out under general anaesthesia. Where ether or ethylene is used the container and the ether mask must be removed from the room before the operation is begun.

The technic of surgical diathermy, as applied to removal of superficial malignancies, is relatively very simple. With a sharp pointed electrode a clean cut incision is made with a narrow line of coagulation around the mass to be removed, well beyond the edge of the actually diseased area. Thus a coagulation zone walls off the neoplasm; the sealed blood and lymph channels guard against induction of metastasis. The heat penetrates beyond the area totally destroyed. It is reasonable to suppose that in this zone the heat devitalizes the cancer cells without injuring the normal tissues; it sterilizes the zone of potential invasion about the original site and decreases or, in fortunate cases, wholly obviates, recurrence. Herein lies a great advantage of surgical diathermy.

Now we proceed with the destruction of the tumor itself. Haemostasis is secured; small bleeding vessels are sealed directly with the elec-

trode, larger ones are caught with a fine-pointed forceps and then sealed by touching the haemostat with the electrode. The heat converts the neoplasm into a solid block of dead tissue, which is gradually thrust out by the growth of the healthy living cells of the epidermis. The coagulation mass is sterile when the work has been completed, but it offers a fertile field for secondary infection. Therefore it is of the utmost importance to remove at once as much of the tumor mass as possible. Removal of the coagulated neoplasm is best accomplished by curetting the destroyed growth with a dull curette.

The after treatment consists of applications of indifferent salves. The scab may be gently removed every third or fourth day and some fresh ointment applied. Sterility customary in other surgical procedures should be strictly observed.

The accompanying illustrations show that surgical diathermy if applied with discriminating judgment affords very striking and exceedingly gratifying results.

In comparison with other methods of treatment of superficial malignant neoplasms surgical diathermy possesses the following advantages.

1. Great accuracy and delicacy of the procedure; a perfect control of depth and extent of destruction is secured.

2. Minimum of hemorrhage; practically a bloodless operation.

3. No suturing.

4. Postoperative pain is reduced in comparison with pain following surgical procedures as sensory nerves are seared off. The words *cito, tuto et jucunde* can fairly be applied to this procedure.

5. Length of the operation is shortened as no ligatures or sutures are required.

6. Likelihood of mechanical dissemination of malignant cells is limited by sealing the lymphatics.

7. Destruction of malignant tissues is an immediate one contrary to the effect of x rays and radium.

8. Resulting scar is soft, pliable and in many cases hardly visible.

9. No hospitalization is required. Surgical diathermy can be safely applied in the office; the fear of going to the hospital is eliminated, the expenses cut down and therefore the patient accepts the advice of immediate removal of the tumor without much hesitation.

In view of these fundamental features we are justified to draw a conclusion that surgical diathermy has been placed on a scientific basis and acquired an important place in the physician's armamentarium as an effective therapeutic agent in eradication of superficial malignancies.

Many fanatics have claimed for this method powers which border on the ridiculous. Such enthusiasm may well be condemned. A certain amount of skepticism is justified in the evaluation of a new method. However, a fair appraisal of the comparative value of excision by knife and electrotherapy shows that the introduction of surgical diathermy forms an outstanding development in the field of therapy of malignant tumors. The use of diathermy demands competence and skill and an indiscriminate use must be condemned. It would be unreasonable at the present stage to assert that surgical diathermy is superior over the older methods in regard to remote results. Only a careful and constant follow-up system over a period of years can establish the true value of this method.

There is no antagonism between physical therapy and surgery; one supplements the other.

Without the knowledge of a definite etiology of malignant neoplasms, the branch of cancer problem concerned with treatment is closely connected with the problem of prevention. A radical removal of potent carcinoma in form of blemishes such as warts, naevi, keloids, angiomatas, pigmented moles must be recommended, as soon as they show signs of malignant degeneration, e.g. rapid growth, change of of color and consistency, etc.

By virtue of the simplicity of the technic and highly satisfactory results surgical diathermy can be regarded as treatment par excellence of these precancerous lesions as well as of superficial malignancies.

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EDITORIAL

ARCHIVES OF PHYSICAL THERAPY, X-RAY, RADIUM

A Journal of Ideas and Ideals.

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INDOOR HELIOTHERAPY

An achievement worthy of note is the perfection of a type of "glass" which permits the ultraviolet rays of the sun to pass through it. That the advancement of such a product on a commercial basis has been received with much favoritism is well exemplified by the fact that owners of many prominent structures now being erected have contracted for this new kind of window.

The public at large fully realizes that the use of the sun's rays is a valuable adjuvant in the treatment of disease. More than its curative value is its preventive possibilities. Much has been written on this latter phase, but more remains to be studied and worked out on a scientific basis. The great danger now lies in the promiscuous employment of irradiations improperly timed and indifferently applied for everything that is called an ailment. While it is true that sunlight and more especially ultra violet energy is more productive of good than harm, nevertheless it must be admitted that its use therapeutically must be based on a definite rationale if the scientific side of medicine is to be considered.

In this connection it is well to emphasize the importance of careful study of the patient by a physician, and if ultra violet energy is prescribed, that the directions be given by one familiar with its administration. The source of the energy is rather immaterial. One must know, however, the possible effects from the source employed during a given time exposure. There are those who hold also that the action of sun treatment is not due to the ultra violet energy alone, but to that of the entire spectrum.

It is not the purpose of these remarks to tell what all the favorable actions of ultra violet rays are. Too much has already been said in the medical literature and an abundance of conglomerated material has appeared in the lay press. Time will eventually rationalize the results of investigators, and clinicians will then be able to handle the subject more satisfactorily. That there are favorable effects of ultra violet radiations on metabolism and on certain

specific diseases such as rickets and tuberculosis cannot be denied.

It is not for the public, however, to administer the treatment without medical supervision even if it can be had from natural sources indoors through new types of window glass.

A. R. H.

ANNUAL MEETING

The sixth annual meeting, held in Chicago October 31-November 5, was an outstanding event. On the program appeared many of the leaders in physical therapy in America. Such names as Harry Eaton Stewart of New Haven, who devised the method of treating pneumonia with diathermy, thereby reducing the mortality rate from the usual 40 per cent to 12 per cent; George Austin Wyeth of New York, and Grant E. Ward of Baltimore, who have done so much to advance the use of surgery by electrothermic methods; J. C. Elsom of Wisconsin University, an authority on physical therapy; Edwin N. Kime of the University of Indiana, whose teaching is respected by all, give only a slight idea of the quality of the program. Edgar Mayer of Saranac Lake held the attention of all by his recital of the value of artificial light in handling the complications of pulmonary tuberculosis. Prof. Albert Bachem reported the results of research done at the University of Illinois during the past year, to determine the depth of penetration of ultra violet through the skin.

The audience sat in closest attention to the report of Prof. Victor Levine of Creighton University, Omaha, on the effect of ultra violet light on food. So interested were the physicians that they kept him in conference for three hours, asking questions. Great interest was also shown in the presentation of clinical results obtained by the use of the super soft roentgen rays by J. J. Eller of New York. This newest development in the field of x ray therapy called forth many questions. This paper will appear in an early issue.

Dr. Hollender, who acted as chairman of the program committee, deserves great commendation for assembling so many leaders in physical therapy.

At the banquet the retiring president, Dr. D. Kobak, gave a review of the progress made by the *American College of Physical Therapy* during the past year. He noted its growth in membership, its attraction of large numbers to the annual sessions, the admirable support of the best minds in physical therapy and the excellent support of the commercial exhibitors, who have acted as a unit in making the exhibit this year the best ever.

The incoming president, Dr. J. C. Elsom, presided with befitting graciousness and poise characteristic of this scholarly gentleman. The registration list showed men in attendance from Montreal to the Pacific Coast, and from Canada to the Gulf of Mexico.

A. F. T.

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INTERNATIONAL ABSTRACTS

Physiotherapy in the Hackensack Hospital, Spencer T. Snedecor, M. D., J. of the M. S. of N. J., April, 1927.

The agents in physiotherapy are classified into six groups: I. heat; II ultra violet light; III other electrical currents, IV x rays; V hydrotherapy, VI mechanotherapy.

Nearly all the agents described under these groupings are used in Hackensack Hospital. Heat is applied therapeutically in three different ways: by conduction, convection, or conversion. Under medical diathermy four different circuits are arranged: d'Arsonval, Oudin, Tesla and autocondensation. These are described in detail. Electrocoagulation and electrodessication are employed. Their different effects are mentioned. The carbon arc and quartz mercury vapor lamps are described with reference to their sources of ultra violet light. Static electricity, faradism, galvanism, sinusoidal currents, x ray are all treated at some length by the author and the important factors emphasized. Space is also given to a brief consideration of hydrotherapy, massage, vibration, and exercises. Summarizing, Snedecor finally states:

The development of the Physiotherapy Department at the Hackensack Hospital has resulted from the wholehearted cooperation of the attending physicians. One and all, they have been interested in the growth of this department of physical therapeutics, and have recognized its value by referring a large number and variety of patients for treatments. Our methods and conclusions are therefore the results of the collective experience of practically all the physicians on the staff of the hospital. We believe our results in these hundreds of cases warrant the statement that physical therapeutics offers many definite and valuable agents for the relief of disease.

Low Volt Electric Waves in Intestinal Inactivity: Physical and Physiologic Considerations, G. Betton Massey, M. D., Physical Therapeutics, Oct., 1926.

Massey sums up the whole question thus: The choice of wave to stimulate muscles and glandular neurons cannot be made by choosing the wave by name, whether induction surge or galvanic sinusoidal, but by the selection of a wave which, when it reaches the intestinal muscles or the neurons through the overlying resistance of skin, fat, and so forth, shall be strong enough to cause excitation, in spite of scattering diffusion. The following conditions are important.

If the height of voltage is immense, as in the static wave, the overlying resistances are negligible and the amperage may be slight.

If the voltage and amperage are moderate, the slant abrupt but round, overlying resistances must be lessened by large, thoroughly moist pads and the current increased to a point where sufficient amperage reaches the desired structures, this being possible because of time curve lessening pain. Under these circumstances the waves of modern generators, such as the Morse, will stimulate intestinal muscles and the neurons of abdominal glands when applied through the abdominal wall.

If the voltage is very low and the amperage relatively large, as in the galvanic sinusoidal reversal, the slant rise may be very gradual, but large, moist pads must also be used to minimize overlying resistances.

In all cases it is not the wave delivered by the generator to the electrode plates that should be regarded as our therapeutic agent in percutaneous applications, but the proportion of the wave that, overcoming the resistances of the skin and omentum, and in spite of wide subdermic diffusion, actually reaches the organ we wish to stimulate. It is altogether a question of concentration at the site of the work to be done, and it must be emphasized that we must employ large currents through large electrode pads that are thoroughly moist and make good contacts, to get effective action when using low volt waves.

The Present Status of X Ray Treatment of Non-Malignant Pelvic Conditions, Arthur W. Erskine, M. D., The Radiological Review, Feb., 1927.

X rays affect fibroid tumors in two ways. First, as a direct solvent of connective tissue, an action which is easily observed when x rays are applied to keloids, and second, by inhibiting or abolishing the internal

secretion of the ovaries. The latter effect of x rays, the so-called "dry castration", is all that is necessary to cure excessive hemorrhage of the menopasue, or that due to fibrosis or small fibroid tumors.

The author gives definite contra-indications to x ray treatment of fibroids and uterine hemorrhage, but states that positive indications are lacking. While the advantages are its relatively small cost, its safety, and the fact that usually, but not always, the patient can go about her usual occupation. X ray treatment has the disadvantage of being slow, and in about half the cases, of temporarily producing a certain amount of nausea and feeling of depression.

An important point considered is the effect of x ray treatment upon sex-life. In about two thirds of the cases no change is noticed. The remainder is about equally divided, half of them reporting an increase and half a decrease of libido. In doses ordinarily employed, x rays have no effect upon the interstitial ovarian structure.

If the cases are selected with reasonable care one may expect satisfactory results 95 times out of a hundred. In a series of about 200 cases of uterine hemorrhage and fibroids, the author has had only five patients abandon the treatment.

Treatment of Infantile Paralysis. Harry Eaton Stewart, M. D., Physical Therapeutics, Mar., 1927.

Stewart acknowledges credit to Dr. William Benham Snow for first calling attention to the possibility of employing the Morton wave from the static machine to minimize pressure destruction in the cord during the acute stage of the disease.

Adequate treatment of the chronic stage must be based on a number of factors. Nowwhere is the indication for the use of combined treatments more clear than in the treatment of infantile paralysis.

The author speaks of the value of the sinusoidal wave, as well as the advantages of assistive, active, and resistive exercises. The latter meet the indication of keping in function the mental and motor pathways which tend to deterioration from disease. In conclusion Stewart remarks: Anterior poliomyelitis is a disease of sufficient gravity to challenge our most serious consideration.. It is one in which physiotherapy offers undeniable aid. The possibility of minimizing the sequelae of the disease through active measures instituted during the active stage is an all important problem in treatment.

No treatment can be considered adequate which does not aid nutrition, stimulate the muscles, and reeducate their nervous control. Treatment should be persisted in for at least three years or, if it has been insufficient, should be resumed, even if ten years have elapsed since the acute attack. The closest cooperation with the orthopedist is essential, that proper braces and operative procedures may be instituted when needed.

Only by taking all factors into consideration to reduce to a minimum the sequelae of this disease.

Can the Body be Sensitized Toward Ultra Violet Rays?, K. Lakschewitz, Monatschrift fur Kinderheilkunde, Nov., 1926.

This writer reviewed the literature of the sensitizing effect of certain colors and found that it makes a big difference whether the body is sensitized toward short or long wave rays. With the long wave rays (red, yellow and green) there results a sensitization by colors, so that the rays, in themselves biologically ineffective, take on this property by the administration of eosin. With the short wave rays (blue, violet and ultra violet), which are in themselves biologically effective, sensitization does not result.

According to these findings it must appear doubtful whether rachitic children can be sensitized by the administration of eosin toward ultra violet rays of artificial sunlight and thereby increase the action of the same, namely to produce an accelerated cure of rachitis. A sensitization toward ultra violet rays is therefore impossible.

Radiation Therapy in Carcinoma of the Breast, Robert E. Fricke, M. D., Radiology, Jan., 1927.

Fricke cites two cases to indicate the difference in response to radiation therapy in different individuals. In the first case the patient, who was seventy years of age, presented a badly ulcerated growth of the right breast, bathed in foul discharge. Several skin infiltrations were present near the main lesion. The condition was of three years' standing. No metastases were detected. The prognosis was bad and all that was hoped for was palliation for a few months. However, the response to radiation was most gratifying. Radium and deep x ray therapy caused a remarkable regression of the growth and restored her general health with good prospects of a permanent cure. The second case presented a small lump in the lower inner quadrant of the right breast with a small area of ulceration. Palpable glands were present in the axilla. The prognosis here was grave, but the general condition of the patient was better than in the first case, the progress of the disease not being as far advanced. Radiation in this instance produced some slight regression, but the pa-

tient's general health declined gradually until death ensued.

The tumors were identical in nature microscopically but different responses were encountered, contrary to expectation. The difference in response to radiation is very interesting and makes it mandatory to give very energetic courses of treatment to all cases, even those that present massive involvement and are apparently hopeless.

Actinotherapy in the Treatment of Rickets, F. W. Schultz, M. D., Archives Americano sde Medicina, 1, 1927.

An extensive review of the literature is given on actinic ray treatment, dating back to an article by Palm in 1890. Palm was the pioneer in presenting studies of the geographic distribution and causation of rickets, suggesting the idea that sunlight should be considered as a therapeutic agent. This was the first publication on the subject and has been followed in subsequent years by a great number of clinical experiments and reports. Huldschinsky in 1919-20 established the following facts: Therapeutic results with exposure of the rays of the quartz lamp are invariably seen in all forms of rickets. The cure is obtained by this means with much greater permanence than by any other methods previously employed. The effects of the treatment are permanent and the process of regeneration continue actively for many months after the end of the treatment. It is therefore the method of choice in these cases.

Roentgen Ray Therapy in Erysipelas, E. S. Platou and Leo Rigler, Arch. Int. Med., 38:573 (Nov.) 1926. (Abst. Arch. of Derm. and Syph.)

In a comparison of two series of cases of erysipelas, one series being treated in the routine manner, with magnesium sulphate and glycerin packs, and the other by means of one application of the roentgen ray, it was found that the latter group showed a prompt improvement in local symptoms and in temperature within from twenty-four to forty-eight hours after treatment, and that the disease in general ran a much shorter course when treated with the roentgen ray.

Only one treatment of the roentgen ray was given, consisting of a dose sufficient to produce a mild erythema (a smaller dose was given on the scalp), the factors being: skin target distance 10 inches (25 cm.), 111 kilovolts (approximately a 7 inch (18 cm. spark gap), 5 milliamperes, five minutes using a 2 mm. aluminum filter.

The Influence of Light on the Reaction to Infection in Experimental Syphilis, Wade H. Brown, M. D., and Louise Pearce, M. D., The J. of Exper. Med., March, 1927.

A series of experiments was carried out for the purpose of determining whether the reaction of rabbits inoculated with *Treponema Pallidum* might be influenced by their light environment. The conditions compared were (1) diffuse sunlight filtered through window glass and subject to variations due to natural causes, (2) constant and continuous exposure to artificial light with a wave-length of from 3022 to 5790 Angstrom units (Cooper Hewitt), (3) complete exclusion of light.

The results showed clearly that each of these conditions produced a distinctive effect and that the effect tended to conform to the nature of the environmental condition. In general, the efficiency of the reaction to infection increased with the amount of light received and with the constancy of the exposure.

Influence of Light on the Growth and Malignancy of a Transplantable Neoplasm of the Rabbit, Louise Pearce, M. D., and C. M. Van Allen, M. D., The J. of Exper. Med., March, 1927.

An experiment is reported in which an environment of constant and continuous light excluding the shorter ultra violet rays, and one of constant darkness, have influenced the course and character of a malignant disease of rabbits induced by a transplantable neoplasm.

Under the influence of constant light the level of malignancy was observed to be low; under the influence of constant darkness the level of malignancy was somewhat lower than in the control animals living under ordinary indoor light conditions, but the level was not as low as among the animals constantly illuminated.

These observations furnish experimental evidence in support of the idea that there is a correlation between the external factor of light on the one hand and the manifestations of an experimental malignant disease on the other.

Some Historical and Clinical Remarks on the Effect of Light on the Skin and Skin Disease, C. Rasch, Proc. Roy. Soc. Med., 20:11 (Nov.) 1926. (Abst. Am. J. Diseases of Child.)

Some of the earliest recorded experiments on the action of sunlight on the skin were performed by an English physician, Sir Everard Home (1763-1832). By covering part of the dorsal surfaces of the hands with cloth and recording the temperature beneath it and on the open surface, he found that on exposure to sunlight the temperature beneath the cloth was higher but

that a dermatitis occurred on the uncovered portion thus indicating the action of an actinic ray rather than heat. He further demonstrated the comparative resistance of pigmented skin to sunlight. Brief reference is made to other early contributions on the subject. Wilson (1798) first described a disease due to sunlight under the name of eczema solare. Xeroderma pigmentosum was described by Kaposi in 1870, but he did not at this time ascribe it to the action of sunlight. In 1878, Hutchinson described prurigo aestivalis. In 1906-1907, Dubreuilh stated that most of the epitheliomas of the face, together with the common so-called senile alterations of the skin, are produced by sunlight. In 1911, J. H. Sequiera described "permanent freckles," and in 1917 Riehl described the so-called war melanosis, almost black pigmentation called forth by light. Bazin's hydroa and transitional types are mentioned. The author records 231 cases of hereditary light eruptions in 31,000 dermatologic cases in Denmark between 1911 and 1925. These included examples of poly-morphous light eruptions (Rasch), hydroa vacciniformis (Bazin) and a special syndrome first described by Prof. T. McCall Anderson of Glasgow comprising porphyrinuria (congenital), large blebs with resulting ulceration and destruction of the nose and ears and lesions of the hands resembling sclerodactylia. Two cases each of xeroderma pigmentosum and Riehl's melanosis were seen and a histologic resemblance of the latter to lichen planus noted. Colloid milium and chronic dermatitis of the neck due to sunlight were seen as were also pigmented spots, atrophic macules, keratoses and epitheliomas due to light. It is recorded that smallpox will heal without scars if the patient is kept in the dark. Attention is directed to a group of diseases aggravated by light, such as rosacea and lupus erythematosus; acne vulgaris, secondary syphilitic eruptions, elephantiasis and lichen planus are mentioned as examples of conditions favorably affected by light. Thirteen illustrations and an extensive bibliography accompany the article.

Roentgen Ray Doses Required to Produce Clinical Erythema, Eugene T. Leddy, M. D., The A. J. of R. and R. T., vol. XVII, No. 2, Feb., 1927.

In the determination of the time required to produce erythema the galvanometer system was used first, and the calculations made according to the method described by Weatherwax. These figures were then checked against electroscopic measurements of the intensity of the ray, with the ionization chamber half submerged in a water phantom, according to the technique previously described.

It should be mentioned in passing that the intensity of redness of an erythematous area is, according to the best authority obtainable, only a matter of the judgment of the roentgenologist making the observation. There seem to be in the literature no well-defined threshold values of erythma produced by heavily filtered roentgen rays of short wave length. Accordingly wide differences by the same biologic and electrical conditions.

The averages of both ionization systems were used for clinical check only up to about 180 minutes, beyond which time clinical experimentation was not considered justifiable, or worth while.

In this group of observations (about 100 altogether) not a sufficient number of cases was investigated to assign limits of erythema production with each value; nor have I investigated thoroughly whether a uniform erythema was produced by the use of any technique for a definite time. However, from previous work it was thought unlikely, as little constancy of erythema production with constant physical factors was observed. Inasmuch as an erythema is here regarded as a first degree burn, without defining its intensity, I have not sought to obtain a uniform redness within the periods given here. However, these values have been shown to be clinically safe, but above threshold value in many cases.

In the chart the ordinates represent time in minutes, and the abscissae, millimeters of copper or aluminum filter. Curves *a* and *a'* are those obtained with roentgen rays produced at 200 kv. maximum, and curves *b* and *b'* at 168 kv. maximum. The curves of aluminum have been given only to about 5 mm., as beyond that thickness the use of copper filters is more convenient. By calculation and by clinical check it was determined that from 16 to 18 kilovolts, in filtration value (considered from the standpoint of erythema production) to 1 mm. of copper. In those cases in which aluminum is used as a secondary filter for copper, the values established by the curves are to be increased by about 3 per cent. These curves have been of considerable assistance whenever a change of technique requiring modification of routine voltage and filtration was indicated, in that correct time of skin reaction could be read directly from the chart.

Whether these values are peculiar to the system of roentgen ray production used, or to the clinical condition of the patients studied (50 per cent being more than fifty years old and often in none too good health) has not yet been fully investigated.

Curves are given of the time required to produce erythema as obtained by two ionization systems and a clinical check. These values should be checked by another dosimeter, and by clinical studies, and might be given in R units if expedient.

Experimental Radium Arthritis and Articular Neoplasm, A. G. T. Fisher, Brit. Med. Jour., Feb. 19, 1927.

Glass tubes containing radium were introduced by Fisher into the knee joints of rabits, and well marked proliferation of the cartilage of the inner and upper margin of the trochlear surface of the femur resulted. The introduction of radium contained in platinum tubes resulted in an acute destructive suppurative arthritis of a fulminating type, which necessitated its restriction. In another rabbit a condition of chronic arthritis of mixed type, or "rheumatoid arthritis," developed. In a third rabbit, a tumor developed from the lower end of the femur. Histiologically, the tumor was clearly an ossifying periosteal sarcoma, which had originated from the periosteum covering the intra-articular portion of the diaphysis and the adjacent portion of the epiphysis of the internal femoral condyle.

The Use of Radium in Treating Impotence Due to Local Causes in the Urethra, Leo C. DuBois. Clinical M. & S., May, 1927.

The author discusses the various phases of impotence and then considers the local abnormalities. The use of radium with special reference to precautions is reviewed. The conclusions as stated by DuBois are:

1. A large number of cases of sexual impotence are due to local causes in the genital tract, causing structural changes in the posterior urethra.

2. Radium has been employed in a series of 42 cases of impotence caused by local conditions.

3. These patients were observed for a variable period, up to four years after treatment.

4. The effect of this form of treatment was highly satisfactory, resulting in thirty-two functionally perfect results and eight which showed marked improvement. Two did not return and the results are unknownn.

5. Only one application is necessary, in the majority of instances.

Diathermy in Shock, F. F. Cottle (Commander Medical Corps, U. S. Navy). U. S. Naval Medical Bulletin, April, 1927.

A case report introduces this subject. The treatment outlined comprises the usual measures suggested by Crile in his book on Shock and in addition the use of diathermy. Crile's article (S. G. O. Feb., 1926), on "The Use of Diathermy and the Quartz Lamp for Conserving the Temperature of the Viscera and Promoting the Welfare of the Patient Before and After Abdominal Operations," is freely drawn upon.

In the case report the author states that the patient recovered from a most extreme degree of shock. It is believed diathermy to the liver contributed largely to this recovery. The author hopes by this report to stimulate interest in the further use of diathermy, thereby helping in the solution of the problem of the best treatment of shock. The question is raised: "Have we, in Crile's suggestion, to apply heat directly to the liver in addition to the usual means of applying heat to the surface of the body, a valuable new additional remedy for shock?"

Survey of Progress in Hay Fever and Asthma Therapy A. R. Hollender, M. D. and M. H. Cottle, M. D. Clinical Medicine, June, 1927.

Several important phases of the hay fever and asthma problem are considered. The literature is freely exhausted to discuss such subjects as allergy and anaphylaxis, immunity, toxic state , ductless glands, the vegetative nervous system, etc. The importance of the calcium factor is treated at some length. The authors aim to substantiate their formerly published results with the recent ones of Brown and Hunter.

In the treatment of asthma, attention is directed to rigid examination, hospitalization and methods of detoxication, since it is believed that a toxic state is found in practically all asthmatics. Asthma in children is frequently relieved by means of ultra violet irradiations combined with the ordinary hygienic measures.

A calcium deficit is the invariable rule in hyperesthetic rhinitis or perennial hay fever, but not so in the seasonal type of this affection. Beck and Pollock are quoted as having cured all of a series of 25 cases of true hyperesthetic rhinitis with ultra violet therapy. Seasonal hay fever must be handled similarly to asthma. General treatment is emphasized in the acute hay fever attack. In surveying the therapy of hay-fever and asthma as advocated by different writers during the past two or three decades, we conclude that certain physical agents offer the most successful means of treating these affections. As in all scientific therapy, empiricism first prevailed, but clinical and laboratory investigations with diathermy and ultra violet rays have fairly well established rationales for their use. These agents do not, however, replace the classic methods of medicine and surgery, but act only as valuable adjuvants to them. Without scientific diagnosis, elimination of pathologic factors and proper individualization, it is unfair to expect that, in physical therapy. the physician has an extraordinary means of curing the so-called hyperesthetic diseases of the upper respiratory tract. Certain it is that no physical agent with a single blow can produce a cure.

The Significance of Cathode Rays in Medicine, W. E. Pauli. Deutsche Med. Wochenschrift.

Two properties of the cathode rays determine the special fields of medicine in which they can be successfully utilized:

1. Their strong bactericidal effect.
2. Their relatively slight penetrability.

According to this only those superficial affections can be successfully exposed to the cathode rays which are caused by microorganisms, such as the various diseases of the skin including lupus. The exposure of infected wounds to the rays should also be considered. Experiments which have already been begun in this direction have yielded very fruitful results. Artificial wounds were made on rabbits and infected with staphylococci and streptococci. Half of the rabbits were left alone and the other half were exposed to the rays. The result was that those not exposed went through a lengthened healing process, with the appearance of pus and in some cases blisters. Those exposed were cured in a very short time. The exposure of ulcus serpens of the cornea of rabbits also produced fine results, which are full of promise for further development.

Various animals with artificially produced ulcers were observed, half of which were treated with the rays and the other half were not exposed. With a certain dose the ulcers were arrested, whereas in the unexposed eyes the ulcers progressed, so that a perforation of the cornea followed.

The conjunctivitis which developed among those exposed to the rays called for care, but with a finer dosage and the use of somewhat denser rays, this undesirable effect can be avoided.

In any case the potential use of the cathode rays will rise considerably when denser rays can be procured in a form which at the same time can be practicably manipulated.

Treatment of Diabetes with Radium Rays, Rosinski and Quedenfeld. Deutsche Med. Woch. No. 47, 1926.

The patients who were treated with radium were kept on the same diet and mode of life to which they were accustomed before the treatment. Any change in the condition of the patient would then be due to radium rays alone. The lowering of the sugar level was the index of the improvement.

The treatment consisted of inserting a capsule of radium into the rectum, 12.5 mg. for six hours, or 28.5 mg. for three hours.

After a short treatment. in addition to the disappearance of symptoms of diabetes such as thirst. pruritus, and general debility, the sugar disappeared in four cases, and only traces remained in two. This result justifies the conclusion that radium rays have a favorable effect on the course of diabetes.

The success of the treatment of diabetes by baths is probably due, in a large part, to the effect of the radium emanation which, however, can never be compared in intensity with the radium treatment.

Radium as a Treatment for Angiomas, M. P. Degrais. Journal Med. de Paris, No. 35, Aug. 30, 1926.

First of all the author states that the use of radium is not dangerous. Radium is painless. It is an advantage that it possesses in the entire meaning of the word. Radium is applicable to all locations of the angioma, irrespective of its size. In fact, its effect on the enormous angiomatous tumors has led the author to state that radium has a veritable selective power over blood capillary malformations. Radium leaves nothing further to be desired regarding the cosmetic result of its treatment. In the majority of cases where tumors were removed, it was well nigh impossible to recognize the place of the original lesion.

Radium therapy can be given to persons of all ages; it should be applied as soon as the angioma appears. The treatment should be given in such a way that the application can be made ten minutes to a maximum of forty-eight hours, with a rest period of six to eight weeks.

Heliotherapy, Armand-Delille. Journal de Medicine de Paris. No. 33, Aug. 16, 1926.

Heliotherapy should be applied to all local chronic tuberculosis, white tumors, coxalgia, Pott's disease. spina ventosa. In the child surgical treatment is thus avoided. Cure can be obtained by heliotherapy in the mountains or on the seashore, and it is only after this means has been tried and has proved insufficient, that surgical treatment should be used.

Tuberculous ganglia, convalescence from serous pleurisy and renal and genitalian tuberculosis are also influenced favorably by the sun cure.

There are, however, contraindications: The efforts made in pulmonary tuberculosis have been futile and even dangerous.

The technique consists in exposing the entire body to the sun;; but the amount of body surface exposed, and the duration must be a progressive process. until finally the entire body is exposed for two, three, four, and even five hours.

The results are remarkable and almost always exceed all expectations. Thus one observes the restoration of normal bone lesions, and the return of joint mobility. Heliotherapy is not only preventive but also curative.

In the author's opinion, ultra violet rays do not give the same results as the sun in joint lesions. They are above all useful as a preventive measure.

Heliotherapy and Surgery, G. River. Journal de Medicine de Paris. No. 25, June 21, 1926.

Surgery has no better adjuvant than heliotherapy. The sun's rays are germicidal at the same time that they favor the elimination of wastes and lymphatic drainage. The sun bath reinvigorates the whole individual. One may conclude that the sun cure often makes surgical intervention unnecessary. But if surgery becomes necessary, the rays of the sun prepare for it, facilitate it and complete it.

On the Treatment of Rickets with Irradiated Dry Egg Yolk, Th. Brehme. Fortschritte der Med. No. 3, Jan. 21, 1927.

Cholesterin, on being exposed to the ultra violet rays, gains antirachitic properties, and this substance is to be considered as the antirachitic substance. All substances, foods, etc., which contain cholesterin must accordingly be capable of being activated. Those rats in the author's experiments which had been kept on an accepted rickets-producing diet, to which irradiated dry egg yolk had been added, showed in all cases absolute freedom from rickets, whereas some of the control rats which were given the same diet, but with the addition of untreated egg yolk in which some previously present antirachitic substance is to be taken into consideration, developed rickets.

This method had equally good results with children who suffered from rickets in whom it is partially combined with latent especially manifest tetany. Spasmophylia symptoms disappeared in a short time and in three to four weeks the symptoms of florid rickets were cured or at least were definitely on the road to cure, a fact which could be ascertained by serum analyses and x rays, in addition to clinical examinations.

In conclusion it can be said that irradiated dry egg yolk represents a very useful, convenient, and very pleasant method for the cure and prophylaxis of rickets in children, so that the other irradiated products such as ultractina-dry milk, should be discarded as inferior regarding their results.

On X Ray Therapy of Myelogenous Leukemia and Myelogenous Subleukemia, Gerta Kwaszewska. Wiener Klinische Wochenschrift. No. 4, Jan. 27, 1927.

There is a sharp difference of opinion as to the success of x ray therapy on myelogenous aleukemia and subleukemia. This difference of x ray therapy in these affections caused the author to report a case in which favorable results were achieved with the roentgen rays.

There was a considerable improvement in the general condition of the patient after exposure to the rays, although the improvement occurred only after a long treatment which seemed useless in the beginning. Parallel with this there was an increase in the body weight, a decrease in the size of the spleen and liver, and most of all an improvement in the condition of the blood, which was especially remarkable as far as the red blood picture was concerned. The white blood picture shows, with a gradual lowering of the total number of leucocytes, a complete disappearance of the myeloblasts, and a slightly smaller number of myelocytes.

The clinical and blood examinations show a favorable influence on the general condition as well as the sought for effect on the blood picture. In the latter case there is no objectionable influence of the therapeutic method on the quantitative and qualitative composition.

The above reported case shows that the careful roentgen treatment under exact hematological control, is definitely indicated in every case of myelogenous aleukemia and subleukemia; all the more because there is no sharp difference between myelogenous aleukemia, subleukemia and leukemia, these clinical conceptions representing three different phenomena of the same disease as the observed changes show.

Roentgenology of Alimentary Tract of Medical Student, T. W. Todd, M. D. Am. J. Roentgenol. and Rad. Therapy, March, 1927.

Todd made a roentgenologic study of the normal alimentary tract in healthy young male students. He says that all parts of the tract are exceedingly sensitive to emotional or nervous conditions. These influence different parts of the tract in divers directions. The stomach becomes atonic in outline, though not in movement or in emptying time. The duodenum shows pseudostasis. The transverse colon exhibits a spasm which may absolutely inhibit the onward passage of its contents. The sites of the cardia and pylorus are affected in similar manner, though not so greatly as are the positions of the greater curvature in the pyloric vestibule and the gastric tube. The normal position of the small intestine in the living individual, whether upright or horizontal, is in the lower abdomen and true pelvis, its disposition is in ladder coils. Peristalsis in the lower ileum may be exceedingly slow in spasm of the transverse colon, one wave taking half an hour to complete its cycle. The proximal colon (cecum, ascending colon, transverse colon) exhibits a peristaltic wave like those of the stomach and the small intestine. Its rate of

progress in the transverse colon is about half that of stomachic peristalsis.

Treatment of Erysipelas by Roentgen Ray, J. E. Harbinson, and J. D. Lawson. Calif. and West. Med., April, 1927.

Roentgen-ray therapy for erysipelas is regarded by Harbinson and Lawson as being a valuable form of treatment. Relief is obtained generally within twenty-four hours. The febrile period is shorter than in infections of equal severity treated by other measures, and the usual length of illness is shortened. There are, possibly, fewer complications and less chance of spread than in other forms of treatment. There is no pain or discomfort attending the treatment. Advanced, serious cases of erysipelas involving fairly large areas, with high temperature and general infection, may be treated successfully.

The Roentgen Ray in Treatment of Skin Disease with Special Reference to Acne Vulgaris, J. Edgar Fisher, M. D. The Ohio S. M. J., May, 1927.

Fisher's conclusions of his study are:

1. With modern apparatus and proper precaution, the roentgen ray can be accurately measured and used in many of the commoner skin disorders with perfect safety.

2. At the present time it is the most valuable local agent we possess in the treatment of acne vulgaris, lichen planus, eczema and dermatitis. In psoriasis, it should be used with caution.

3. Excellent results are being obtained in verruca plantaris, epithelioma of the skin and ringworm of the scalp.

4. Among other diseases it has proved its worth as an antipruritic agent in pruritus, ani and vulvae. In mycosis fungoides it is the method of choice in checking the progress of the disease in the early stage and in relieving the intense itching.

Special Exercise for Increasing Extensibility of the Back, Philip Lewin, M. D. J. A. M. A., April 23, 1927.

The exercise is presented as a valuable one to increase the extensibility of the back and the power of the abdominal muscles. It is especially recommended in that large group of patients with contracted muscles and ligaments in the lumbar, lumbosacral and sacroiliac regions. It is not an easy or a beginning exercise.

The apparatus consists of a 1½ inch belt strap 15 inches long, fastened to the floor, and a small stool, 14 inches high, 11 inches wide and 18 inches long. The subject sits on the stool and the forefeet are slipped through the strap. The hands are placed behind the head. On the count of one, the trunk is allowed to hyperextend until the head touches the floor. It remains in this position during the counts of two and three, and on the count of four the return to the starting position is made. This exercise should be done from ten to twenty times each morning and night, but this number is to be attained gradually. At first a pillow or soft pad is placed on the floor to receive the head, so that the extreme position is not assumed.

During extension there is a combined effect of gravity resisted by the abdominal muscles. During flexion the abdominal muscles are given much work to perform. A similar exercise described by R. Tait McKenzie, which requires more apparatus, is called the "star bar" exercise.

Elective Action of Ultra Violet and Radium Rays, J. Seide. Deutsche Madizinische Wochenschrift, Feb. 18, 1927.

Seide irradiated Hydatina senta (rotifers), which form parthenogenetic ova at short intervals. When he used radium, the ova were injured and the helminths survived—just as postulated by the Bergonie-Tribondeau law. On the other hand, ultra violet rays killed the animals, while the ova developed. This confirms Ruppert's observations.

Biology of Light in Dermatology, Herman Goodman, B. S., M. D. Physical Therapeutics, June, 1927.

In summarizing this paper, the author writes as follows:

In the unpublished part of this paper I have given a brif outline of the the history of the use of light in medicine and surgery with emphasis on the matter of dermatology. The "negative" as well as the "positive" influence of light in skin conditions was mentioned. Smallpox was given as the disease which did better without light, but we should recall that certain instances of what is known as "lupus erythematosus disseminatus" seem to be due to the effect of light on the skin. Pellagra may be another of the diseases in which light has an active share. Those of us who have seen and studied real pellagra well remember that the exposed parts, the back of the neck, and the lower parts of the arms, show the dermatologic expression of this disease. The facial eczema in babies, the type of fixed lupus erythematosus which bridges the nose, the sailor and farmer skin with cancerous and precancerous lesions, and that strange malady described by Hutchinson which we call "recurrent summer eruption," all these and perhaps others have exposure to light as a factor in their etiology. There is then a place for what I call "negative phototherapy," the avoidance of

exposure to light in the prevention and treatment of disease of the skin.

As far as the limitations of time and space permitted, I have given the essential physics of light of the therapeutic zones, with especial consideration to sunlight, mercury arc in quartz, carbon flame lamps, tungsten arc lamp, incandescent bulbs, mirror radiation, and sources of infra red. I have stressed the fact that we are constrained to use a mixed light therapy, a gunshot therapy as it were, with various proportions of infra red, visible, and ultra violet zones present in practically all therapeutic apparatus. I have given expression to the lower limits of ultra violet in each of these emanators.

In the second part of my paper I have taken up the more important biologic problems as they relate to the utilization of light in therapeutics. I have reviewed the feature of penetration. I have found fault with the concept of penetration, as the most modern studies demonstrate that what we have accepted as the therapeutic zones of light have little or no penetration. I have given verbatim the findings of Krogh on the blood supply of the skin. The vessels to the skin lie fairly deep, below the germinativum layer. If there can be no direct effect of the biologically active rays, what factor reaches these vessels? Have the explanations of indirect effects really explained anything?

I have in this paper indulged in some speculation as to the effective zone of ultra violet. The upper limit seems well established. The fact that ordinary window glass cuts off the effective zone is recognized. Just what the lower limit is must yet be learned. The figure 2850 Angstrom units has been suggested. Whether this be so or not is not a sufficient datum. We must know the concentration of the effective wave lengths. Quantitative studies must be made. Those under way are indicative, but as yet it is not my privilege to give definite percentages. The character of filters and the effect of filters used in experimental therapeutics will enlighten us soon.

The factor of time is brought into the discussion. Dosage has been empirical to date. Have we given enough thought to it Are we able at this time to answer two questions? May we safely and effectively substitute 150 minutes exposure in one day for five minute exposures daily for one month, granting, of course, that the source of the light in and by itself is not contraindicated for such a long single exposure?

I have closed the body of my paper with the feature of therapeutic significance in dermatology, and that is the advantage of treating by exposing the healthy rather than the diseased skin to the rays of vital light. General rather than limited local exposures should be the rule. This summary must take the place of any conclusions. Conclusions are such final things. Light in the therapy of human beings is still in flux. No conclusions are possible.

The Effect of Radiation on the Processes of Nutrition. Mario Acqua, Raggi Ultravioletti, 5-6-1926. Abstract—Fort. der Med., No. 34, 1926.

Five cases of rickets are reported, in which the favorable influence of ultra violet radiation is established. Intensity 1200 candle light, distance 45 cm.; starting with three minutes in front and three minutes in back, increasing to twelve minutes; irradiations daily for two weeks. Author believes in a direct influence of the ultra violet rays on the chemistry of the cell and on the processes of assimilation of foodstuffs.

Can Ultra Violet Rays Be Employed Against Malaria? Lodovico Armani, Raggi Ultravioletti, 5-6-1926. Abstract Fort. der Med., No. 34, 1926.

In a patient with a suppurating tibial wound, which resulted from an accident ten years ago, and who contracted malaria two months ago, an attack is prevented by means of large doses of quinine. There are plasmodia in the blood. Quinine does not reduce the fever, but ultra violet light does. With alternating local and general applications the tibia wound also closes. After the eighth irradiation the fever again rises and is again brought back to normal by quinine and ultra violet light. The author wishes to induce the use of ultra violet light in the conquest of malaria. He cannot himself give an explanation of the effect of the rays, and mentions the various theories of their action.

Use of a Preparation of Irradiated Cod Liver Oil in Laryngo-Otology. V. Malmstrom, Nielsen Zeitschrift fur Laryngology Rhinology, Otology, No. 14, 1926. Abstract—Fort. der Med., No. 34, 1926.

The following results can be obtained with irradiated cod liver oil: By the injection method the dysphagia in larynx tuberculosis can be relieved, in some cases. In other cases the remedy is of no value. It is not a general remedy for tuberculosis, nor for lupus of the mucous membranes. Neither could favorable results be obtained in ear suppurations. The remedy, however, is efficacious in the treatment of pleural pains.